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Agriculture.

COTTON CULTIVATION IN QUEENSLAND.

BY A. J. BOYD.

The following notes on cotton-growing in this State are based on actual experience of many years during which the industry has been carried on more or less vigorously both inland and on the coast lands of the State, which is favourably situated in the latitudes especially suited for the successful raising of cotton crops south of the Equator. The great cotton-growing districts of the world all lie within a certain zone, beyond which cotton cultivation has not proved profitable. This belt is comprised between latitudes 36 degrees north and 36 degrees south of the Equator. Queensland lies entirely within the southern limits, and is therefore eminently designed by Nature for cotton-growing. It will easily be understood that even in this favourable zone there are large areas unsuitable for cotton-growing—such as high tablelands, pure sandy tracts, swamp lands, or localities subject to sudden variations of temperature. Cotton loves a warm temperature; and where this is found combined with a moderate rainfall, there the plant will reach the greatest perfection. The Uplands cottons can also withstand long spells of dry weather; but the Sea Island variety demands a moisture in the atmosphere, which it only finds in the tropical portions of the State—say, northward from Mackay. Such are the climatic conditions to be sought by the cotton-planter.

CHOICE OF SOIL.

This is the most important matter to the cotton-grower. Whilst the plant will *grow* on almost any soil, it does not follow that it will be *productive* on each. The soil on which cotton thrives best need not be of the richest description, but neither may it be deficient in the special food needed by this crop. Some of our richest maize and sugar soils have yielded very indifferent cotton crops, while poorer soils, under exactly the same climatic conditions, gave handsome returns. In choosing a soil, therefore, for cotton-growing, a deep sandy loam, not too rich in humus, should be preferred to a heavy rich black soil. Heavy clay soils should be avoided, as they are more difficult and expensive to work. Stagnant water is one of the worst enemies to the cotton plant. What is required to ensure a good crop is a free soil, with good drainage, enabling the plants to obtain all the moisture they need whilst, at the same time, the superfluous water drains away. The cotton plant sends a long tap root into the ground, and it is this which enables it to thrive in continued dry weather. The preparation of the soil for a crop consists in ploughing and cross-ploughing as deeply as possible. Deep ploughing increases the water-holding capacity of the soil, and it also helps to mix the soil by quickly softening the more friable portions and allowing them to percolate into the cracks made by the ploughing process. It also permits the wind, water, air, sunlight, earthworms, bacteria, and other plant, animal, and mineral agencies to better perform their work of soil-building.

SOWING THE SEED.

In the old days of cotton-growing in Queensland, cotton was often sown in rows 6 ft. apart, with the plants 3 to 4 ft. apart in the rows. Such distances are now deemed excessive, except in the case of the Wide-spreading Sea Island varieties, or the Caravonica, grown at Cairns, which is planted in rows 7½ ft. apart and almost the same distance between the plants in the rows. Then, and up to the present day, the Upland cotton, both in the Southern and Central districts of the State, was considered to succeed best in rows from 3 ft. to 4 ft. apart, the plants being from 18 in. to 2 ft. apart in the rows in light soils, and 4 ft. by 2 ft. on richer land.

SPACING OF COTTON TO GET THE BIGGEST YIELD.

For years there has been a difference of opinion amongst cotton-growers all over the world on the spacing of cotton to obtain the greatest yield. The experience of to-day is that, generally, cotton gives the greatest yield when planted in close spacing. Exhaustive experiments to decide this question of spacing were made of late (1916) at three Mississippi Experiment Stations in the United States of America. The results showed that on land of moderate fertility, 3½-ft. rows with the plants spaced 12 in. apart in the drills, the yield was 1,632 lb. of seed cotton per acre. At 16 in. in the drills and 4 ft. between the rows, the highest yield was 1,274 lb. of seed cotton per acre.

The conclusion is that with the earlier dwarf varieties of Upland cotton, close spacing gives the highest yields.

THE NEW SYSTEM OF COTTON CULTIVATION.

The system here described and recommended, has been tested in the United States both by the Department of Agriculture and by practical farmers. It is this:—To secure an early short-season crop of cotton, thin the plants later and leave them closer together in the rows than is now customary. Keeping the plants closer together during the early stages of growth restricts the formation of vegetative branches, and induces an earlier development of fruiting branches. So long as the plants are close together, they do not form these vegetative branches; hence, by thinning them when the stalks have grown beyond the stage where these useless vegetative branches are produced, the latter are almost entirely suppressed.

This makes it possible to leave more plants in the rows than is now customary, and yet avoid injurious crowding.

THE BEST TIME TO SOW

in the South is from the latter end of August to October, November is rather late; but full crops have been gathered from November sowings, principally in districts where frosts only occur late in June or July.

PICKING.

Picking will begin for early-sown cotton about January or February, and for November sowing about March or April; and will continue until the frosts of July and August cut down the plant.

There are still people who hold the belief that black labour is required for getting off the crop. No such labour is needed, nor has it ever been employed, except in the very early days of the pioneer companies in the Southern portion of Queensland, where almost all the cotton exported was then produced. From first to last, cotton is a white man's crop. As soon as the bolls begin to open, they should be allowed to fully expose the cotton, which should be full and dry before being picked; and then the work should be taken in hand at once; otherwise the cotton will become somewhat discoloured by exposure to sun, rain, and dew. Cotton-picking is a far less laborious work than picking strawberries or Cape gooseberries. If the plants have been properly grown, the picker has scarcely got to stoop. With a full crop, young boys or girls of from fourteen to fifteen years of age can easily pick 100 lb. of cotton a day, and experienced pickers can pick with both hands. Under favourable circumstances in the height of the season, smart pickers can pick from 150 to 200 lb. in a day. Picking should not be begun until the dew has completely dried off the bolls, so that a day's work means from about 9 or 10 o'clock in the morning until 5 o'clock in the afternoon, including the dinner interval. When the crop is in full swing about January and February—*i.e.*, when the trees are loaded with fully-burst bolls, from which the cotton comes away easily at a light pull of two fingers and the thumb—six people of a family can pick at least 600 lb. a day, and usually much more. Suppose that a farmer has 10 acres under cotton, and, at a low estimate, has a 1,000-lb. crop, he

will have 10,000 lb. to pick. Then, if only 500 lb. are picked daily, the whole crop is gathered in twenty days. But at the first picking there will not be such an exuberance of open bolls; neither will there be full pickings towards the end of the season. Then wet days and necessary work on the farm must be taken into consideration. Given, however, a month, or six weeks even, in which to gather the whole crop, it will be seen that 10 acres can easily be managed by one small family besides paying attention to other crops.

PICKING BY HIRED LABOUR.

Advocates of cotton-growing are frequently confronted by the opinion that the cost of picking by hired labour would be a bar to the success of the industry. This is not borne out by facts, as the high wages now ruling for rural workers have not had the effect of reducing the area planted with cotton, but rather the reverse.

When the cotton is picked, it should be taken to the barn or store-house, and all bits of leaves, sticks, and damaged or immature cotton should be taken out. A process called "whipping" makes this work easy. It consists in throwing the cotton on to a wire-netted frame (⅝-in.). This gets rid of all sand, soil, stones, &c., which may be adhering to the fibre. Carelessness in this respect results in a charge of 1s. per 100 lb. for whipping by the ginner.

COST OF COTTON-GROWING.

The net return to the growers of the 1915-1916 crop was £7 14s. 9d. per acre.

The amount of seed required per acre ranges from 5 lb. to 10 lb.; and the Department supplies all applicants with the maximum of 10 lb. per acre, thus making allowance for misses, due to possibly defective seed or unfavourable weather conditions. It should be noted that the seed drills should not be deeper than 3 in., and that the land before sowing should be perfectly clean and in fine tilth; also, that after sowing it be kept perfectly clean, as the growth of the plants will be materially checked if they are smothered with weeds.

THE BEST VARIETIES TO SOW.

In Southern Queensland, the Uplands varieties produce the largest crops. Amongst the best are Russell's Big Boll, Durango, and Jones' Hybrid. The Durango was lately imported from the United States, and has proved a heavy bearer, as did also Russell's Big Boll.

For Tropical Queensland, Sea Island and Caravonica are profitable, but only on the coast, as they require much saline atmospherical moisture.

These cottons also require wider spacing owing to their spreading habit, and should not be planted closer than 7 ft. between the rows and 7 ft. between the plants in the drills. This necessitates topping and pruning.

INLAND LOCALITIES.

So far, the planting of cotton on the coast lands only has been dealt with; but it must not therefore be inferred that the plant will not succeed far inland. Splendid cotton has been produced in the inland Central District, as well as on the Southern and Western Railway Line beyond Toowoomba, also at Thargomindah and Barcaldine.

SUMMARY.

(1.) Uplands cotton will succeed to perfection in the Southern River Districts—such as Nerang, Coomera, Pimpama, Logan, Albert—and all along the coast to the extreme North. West Moreton has also been amongst the greatest cotton-growing districts in the past.

(2.) Cotton is a sun-loving plant. It does not demand a large amount of moisture, and general practice has shown that the necessary moisture is best supplied by deep cultivation of a fairly porous or well-drained soil.

(3.) The after cultivation of cotton is the same as that required for maize, mangolds, or any other crop on which machines can be used until the foliage prevents the passage of horses. Until then, the cotton crop must be kept thoroughly clean and the soil in good tilth.

(4.) The crop will come in about March, often earlier, and continue for three months at least.

(5.) Cotton is ready for picking when the bolls turn brown and burst open.

(6.) Picking should not begin in the morning until the dew has evaporated from the plant.

(7.) A man can pick 100 lb. of cotton a day, and, as the season advances, up to 200 lb.

(8.) The price paid for picking depends upon whether the grower does the picking with the help of his family, or hires outside labour for the work.

(9.) No black labour is required, even in Tropical Queensland. White pickers can do better than coloured men.

(10.) The lowest Queensland average crop is 1,000 lb. per acre; and under favourable circumstances 2,000 lb. and even more have been harvested.

(11.) One thousand pounds of seed cotton will yield from 300 lb. to 400 lb. of lint (ginned cotton).

(12.) An advance of 2d. per lb. for cotton in the seed will be made to growers who deliver their cotton to the State Ginnery during the next three seasons. When the cotton has been ginned and sold, all profit derived, after the ginning expenses have been paid, is divided amongst the growers in proportion to their supplies.

(13.) Comparing the returns from maize, wheat, and cotton, the final results are distinctly in favour of cotton. The expense of a cotton crop from seed time to harvest is far less than the expense of either cereal crop. Maize and wheat require to be threshed after pulling, husking, reaping, and binding. Cotton demands no outlay beyond the cost of picking; whilst cartage and bags are incident to all three crops.

(14.) When the cotton is picked, it should be exposed for a few hours to the sun, to extract any moisture which may be in it.

(15.) When the crop is finally gathered, cattle may be turned into the field, the exhausted cotton plant furnishing a quantity of nutritive fodder.

(16.) The cotton plant may be pruned, when the following crop will come in a month or more earlier; but, considering the cost of labour, it is more profitable to plough out the old plants and resow.

DISEASES AND INSECT PESTS.

In the older cotton-growing countries there are several fungoid diseases and insect pests, few of which have ever appeared in the Queensland cotton fields. The worst enemy of the plant in this State is the boll-worm, which bores a hole into the immature boll and destroys the fibre. The dreaded boll weevil—which has cost the United States of America £14,000,000 in the attempt to eradicate it, but which still continues to ruin the cotton fields in that country—is unknown in Queensland; neither has the American red cotton stainer nor the leaf-eating cotton worm appeared. A brilliantly-coloured, shield-shaped bug, which is often seen on the opened bolls in Queensland, is practically harmless.

The best remedy against the boll-worm is to plant trap crops. The worm prefers maize to any other plant; and this gives the cotton-planter a means whereby he may protect his cotton from their depredations. The plan to adopt is as follows:—Between every 25 rows of cotton, 5 rows are left vacant, 1 of which is planted as soon as possible with early-maturing corn. When the ear silk appears, examination must be made for the eggs of the moth; and when these are removed and no more appear, the whole plant is cut down and may be fed to stock. Now plant 3 or more rows of corn, or alternate corn with cow-peas. The peas should come into full bloom at the time the corn is silking. This means that the peas must be planted when the corn has appeared above ground. The 3 rows of corn should be silking in December. Upon the ears of these corn plants a large number of eggs will be found; and these should be allowed to mature, in order to prevent the destruction of the natural enemies which are parasites on the eggs and worms. The hosts of worms are also cannibalistic and devour each other. No destruction

of these ears is recommended till the whole generation has been parasitised. The fifth and last row of maize is then planted to catch the eggs of the few moths which have matured, and these are destroyed by burning. The success of the trap crop depends entirely on having the corn in tassel in December; and it must be planted considerably later than the normal time of planting in spring.

ENCOURAGEMENT OF COTTON-GROWING BY THE DEPARTMENT OF AGRICULTURE.

As far back as 1904, in consequence of a short crop of cotton in the United States of America, the Department imported cotton seed, and about 100 farmers in the Southern Districts availed themselves of the opportunity afforded them to obtain seed gratis. The results were highly satisfactory to those who took the trouble to carefully cultivate the crop, notwithstanding the drawback that much of the seed was not sown till December. No farmer received less than £5 per acre for his seed cotton, and some got as much as £16 per acre. The general average cash return amounted to £9 9s. per acre gross.

For the past two years the Department has distributed local and imported cotton seed to farmers, and in 1915 advanced to the growers 1½d. per lb. for their crop, and in 1916, 1¾d. per lb., these advances being subject to a further payment of all profits derived from the sale of lint and seed, after all expenses have been deducted. The result was, that growers of the 1915-1916 crop obtained a price of 2.54d. per lb. for their cotton in the seed. The amount of lint (ginned cotton) from the crop gathered in 1917 was approximately 33,000 lb., which was sold locally at 11d. per lb. The growers have received the advance and will also receive all profit accruing from the sale, less charges, bringing their return to probably 3½d. per lb. for their cotton in the seed. At the time of writing, the final results of the ginning were not available and can only be given approximately.

For the 1917-1918 crop, and for the ensuing two years, the advance will be 2d. per lb. for cotton in the seed.

The Department has done much to foster the industry, by erecting ginning machinery, undertaking all marketing and transport, importing seed of the best kinds, distributing it gratis to intending growers, publishing and distributing gratis to all prospective and present growers literature up to date on the whole business of cotton-growing, and generally entering into the business of once more establishing on a firm basis an industry which, in 1871, when the farmers had no such assistance, brought in £79,317 from 2,602,100 lb. of cotton exported—the produce of 12,963 acres.

Between the years 1866 and 1873, the quantity of cotton exported from Queensland amounted to 10,324,433 lb., of a value of £427,596; and this without any assistance such as is now afforded by the present Government.

WHAT SOUTH AFRICA HAS TO SAY ABOUT COTTON CULTIVATION.

Mr. W. H. Scherffuis, M.S., Chief, Tobacco and Cotton Division, Union of South Africa, wrote as follows in the "South African Journal of Science" of December, 1916:—

"*Cotton as compared with Mealies* as a Drought Resister.*—It has been proved repeatedly that cotton is far superior to mealies as a drought resister. We have a number of instances on record where farmers planted a portion of their lands to mealies and a portion to cotton; the drought was so severe that the mealies came to nothing, while the cotton gave a fair yield of lint. Last May, I had a report from a farmer in the Waterburg district, who informed me that last season he planted 400 acres to mealies, and, on account of the severe drought, he reaped nothing. He had 2 acres planted to cotton, and he reaped 1½ tons of cotton. This farmer intends to plant 200 acres to cotton next season. I have had many similar cases reported. These results obtained by farmers verify results obtained at our experiment stations.

"I should like to make it clear, however, that the first few weeks after the seed is sown is a very critical period. The young plants must have a moist soil until they are well established, after which they will stand a lot of drought, and still recover to a considerable extent when the rains set in again.

"*Profits in Cotton Culture compared to those in Mealie Culture.*—The average yield of mealies per acre in South Africa is about four bags; placing the value at 10s. per bag will give a total profit of £2 per acre, or a net profit of about £1 per acre. A cotton crop of only 600 lb.† of seed cotton would give 200 lb. of lint; placing an average value of 6d. per lb. on it will give a gross profit of £5 per acre, and a net profit of approximately £2 10s., and there are still 400 lb. of seed left, which, if ground, make an excellent stock food. If a larger yield of mealies or cotton is obtained, the relative values will increase in about the same proportions as those given above.

"*Varieties Suited to South Africa.*—In the middle or bushveld, some of the American varieties, such as Cleveland, Bancroft, Pullnot, Russell's and Bohemian give the best results. In the low veld, where the soil is very fertile, and on portions of the coastal belt, such as Natal and Zululand, Cook's Long Staple, Nyassaland, Allen's, and Sunflower, have given the best returns. A new variety, Taylor's Long Silk Staple, is being bred at the Rustenburg Station; this variety has a beautiful long, silky staple, a scant foliage and upright trees, which are all points in its favour, but whether it is going to be superior to some of the old-established varieties we are not yet ready to state.

"All of the above varieties are annuals,‡ and should be resown every season. I have heard of a few instances where farmers have

* Mealies means maize.

† An average crop in Queensland is 1,000 lb. of seed cotton, and over 2,000 lb. have been harvested from an acre.

‡ The Caravonica which was evolved by Dr. Thomatis in Queensland is not an annual, and, like other tree cottons, is pruned with good results.—Ed. "Q.A.J."

ratooned (pruned or cut back) their cotton trees and left them over for the second season with good results, judging from their reports. When this is done the second crop of cotton usually yields a shorter and inferior lint. A perennial variety by the name of Caravonica has been tried in many parts of the Union, but the results have been very disappointing, especially in the interior. Our records show that a few farmers have been successful with it, particularly in humid coastal areas. Mr. Loffler, of Zululand, is reported to have obtained good results with this variety.

"*Does Cotton Impoverish the Soil?*—In theory, cotton could be grown continuously on the same soil, provided the stalks and seed are returned to the soil, as the lint is almost a pure hydrocarbon. In practice, we usually burn the stalks to prevent insects from harbouring in them during the winter, and the seeds seldom find their way back to the same land; therefore a rotation of crops is advisable, as it keeps the soil in a better physical and chemical condition. Cotton is the least exhaustive of soil fertility of most commercial crops grown in South Africa; for example, cotton requires in fertilising elements approximately two-thirds as much as wheat, one-third as much as tobacco, and a quarter as much as mealies.

" In a series of fertiliser and rotation experiments we found that phosphates gave better results than either nitrogen or potash, but a complete fertiliser gave far better results than those obtained from the application of any one of the three elements. Similar results were obtained from tobacco, mealies, forage, and legumes, which indicated that the soils were deficient in phosphates."

THE COTTON OUTLOOK.

The American requirements for cotton for the coming season will be about 7½ million bales for the local mills, including linters and cotton used for munition purposes. It is apparent that the world's surplus of American cotton at the end of the season will be exceptionally small, and in view of American requirements, the supply outlook is a disconcerting one. As America will use 7½ million bales this season, this will only leave 5 million bales for the rest of the world. Whether the war continues another twelve months or not, there is every probability of a cotton shortage. The world's consumption is hardly likely to fall below 14,800,000 bales if the cotton can be obtained, although with the smaller acreage placed under cotton this season than last, and the admittedly poor start the cotton has obtained, a yield equal to the probable demand is unlikely. Cotton is in an undoubtedly strong position, and there seems no reason why a change should come about. In the middle of July last, "Middling" American was quoted in Liverpool at 19d. per lb., and " Fairly good" Egyptian, at 31.10d.—" Cotton," Manchester, July, 14.

FARMERS' EXPERIMENT PLOTS IN THE CENTRAL DISTRICT.

G. B. BROOKS, Instructor in Agriculture.

SORGHUMS.

An article was contributed to the "Journal" for October, 1916, giving the results obtained from the Grain or Dry District Sorghum experiment plots conducted in the southern district for that year, together with some general directions in regard to the culture of this crop.

It was intended to carry out similar tests in the Central District during the present year on a much more extensive scale, but on account of unforeseen circumstances arising through the war, only three plots, out of the twelve proposed, were arranged for.

As pointed out in the previous article, the main objective in growing this crop is to ascertain its grain-producing qualities in comparison with maize, which under the varying climatic conditions obtaining over most of our agricultural areas is a somewhat inconsistent yielder.

The 1916 season was favourable in this respect, for in localities where the maize crop failed on account of the absence of rain, yields as high as fifty bushels per acre were harvested from the grain sorghums, thus upholding their reputation as dry district grain-producers.

Fortunately, the 1917 season was an unusually moist one; therefore, further data in regard to their drought resistance could not be ascertained. Other important factors were, however, secured, such as the yield of grain and green material under moist conditions, and the effect of a wet season on the varieties having compact seed heads.

As the grain sorghums are also likely to be of some importance as fodder-producers, a comparison was made by including three fodder varieties in the test.

Location of Plots.

Two were situated adjacent to the Dawson Valley Railway line, the other being at Capella, on the Clermont Railway line. The former is some 90 miles, and the latter 200 miles from the coast. One of the Dawson Valley plots was on the farm of Mr. F. Medlon, Deeford. The land was recently cleared brigalow scrub, the soil being of a brown loamy nature.

The other plot was on the farm of Mrs. M. Carnell, Wowan. This was forest land, adjacent to the Dee River; the soil being a sandy loam, rather inclined to bake.

The plot at Capella was sown on Mr. A. S. Bailey's property, the land being rolling downs country and the soil a dark loam.

Date of Planting.

Sowing was carried out at the respective centres during the third week in December. The grain was planted in rows three feet apart, three to four pounds of seed being used per acre.

Climatic Conditions.

No exact rainfall records were obtainable, but at each centre the amount of moisture was undoubtedly more than met the needs of the crop. During the period of growth the rainfall in the Dawson Valley was estimated at some 18 inches, while at Capella it was in the neighbourhood of 24 inches. It may be mentioned that the rainfall on several of the plots during 1916 did not exceed 4 inches.

Harvesting.

In the Dawson Valley the Amber and Saccharatum varieties were harvested during the first week in April, and other sorts a fortnight later. At Capella the respective varieties required a month longer to mature.

Yield.

The moist season was responsible for an exceptionally heavy growth of stalk. This fact is made apparent by the increased weights of green material secured, practically double that obtained during 1916.

[Accompanying the above are some very interesting graphs, one showing the variation and yield of grain obtained per acre in the respective districts, another gives the variation and yield of green material per acre, while the third shows the average yields obtained both in grain and green stuff for 1916 and 1917. It is regretted that owing to exigencies of space these graphs have to be omitted, as also those of Feterita at Wowan, Giant Honduras Sorghum at Mount Larcom, and a general view of the experiment plot at Deeford.]

Stud Plot.

In adidtion to the variety tests, a Stud plot, with "ear to row" test, was also arranged for on the farm of M. Carnell, Wowan, the variety grown being Standard Milo.

On account of the very favourable season, the growth was so rank as to cause lodging, making harvesting operations both tedious and difficult. The weight of green material was at the rate of 25·3 tons per acre, and the yield of grain 64 bushels. Unfortunately, the "ear to row" tests (10 in number) were so tangled up that the securing of reliable data was impossible.

Selecting Stud Seed.

In regard to fodder varieties, so far little attention has been paid to grain production. In securing seed for the 1917 plots, a selection was made from both a grain and fodder point of view.

This has undoubtedly been the means of very materially increasing the grain production of those sorts. The average yields for the fodder varieties for 1916 was 25·6 bushels per acre, while for 1917 this jumped to 52. The increase for the grain varieties was also a substantial one, the average for 1916 being 50·8, and for 1917, 70·2 bushels. In securing seed for the coming season's stud plots, and "ear to row" tests, the average weight of the ears selected shows a marked increase over those threshed out for the past season's (1917) operations. The following are

the average weights of the ears of the respective varieties selected both for 1916-17, and 1917-18:—

Variety.	1916–17.	1917–18.	Heaviest Head in Selection—1917–18.
	Oz.	Oz.	Oz.
Crossbred, No. 1 Selection	7·0	11·8	13·0
,, No. 2 Selection	..	10·0	10·5
Giant Honduras	..	6·8	8·5
Cream Milo	4·8	5·9	7·5
Feterita (Sudan Dhourd)	4·0	5·6	6·8
Planters' Friend	3·0	5·1	6·8
Standard Milo	4·2	4·9	5·5
B.H. Kaffir	3·4	4·7	6·8
Dwarf Milo	4·2	4·9	5·0
Shantung Dwarf	3·2	3·6	4·0
Saccharatum	2·5	2·9	4·3
Amber	1·5	1·8	2·0

It will be noted from the above that the cross-breds selected have exceptionally heavy seed heads, thus giving much promise in regard to increased grain production. Several undesirable features will no doubt have to be guarded against, such as spreading habit, late maturing, astringent grain.

Cross-bred plants producing white grain is somewhat unusual, the colour invariably being from a light to dark red, somewhat similar in appearance to Standard Milo. There is a wide variation in the colour of the hull; in some plants it is a light grey, in others amber, while a glossy black is not uncommon.

The photographs on page 197 show different types of cross-bred heads and the relative size between them and a large head of the Cream Milo variety. The measure lying between Nos. 3 and 4 is 1 foot in length.

Adverse Factors.

The quality of the grain was not affected in any way by the heavy rains, but in the districts more adjacent to the coast the maize caterpillar did some damage to the high-yielding compact-headed varieties, more particularly the Cream and Standard Milos. Feterita was affected to some extent, and to a lesser degree B. H. Kaffir. In the Emerald District (Capella and Gindie) the pest was not much in evidence. Its attack on the maize crop was in several localities also much more severe this season than is usual. In the event of its recurrence the breeding of heavy yielding varieties, with a more open seed head, which is less liable to attack, may have to be considered. It may also be desirable, in view of the fact that this crop is likely to be raised largely for grain production, to give more attention to the propagation and improvement of high-yielding dwarf sorts.

A number of sorghum varieties, including those experimented with, were grown during the past season at both the Warren and Gindie State Farms as an ensilage crop. Very heavy yields were obtained at both places. Mr. Burnage, manager of the Gindie Farm, stated recently that he had already secured two heavy cuttings from his sorghum paddock, and had hopes of getting another within twelve months of planting, with further cuttings next season.

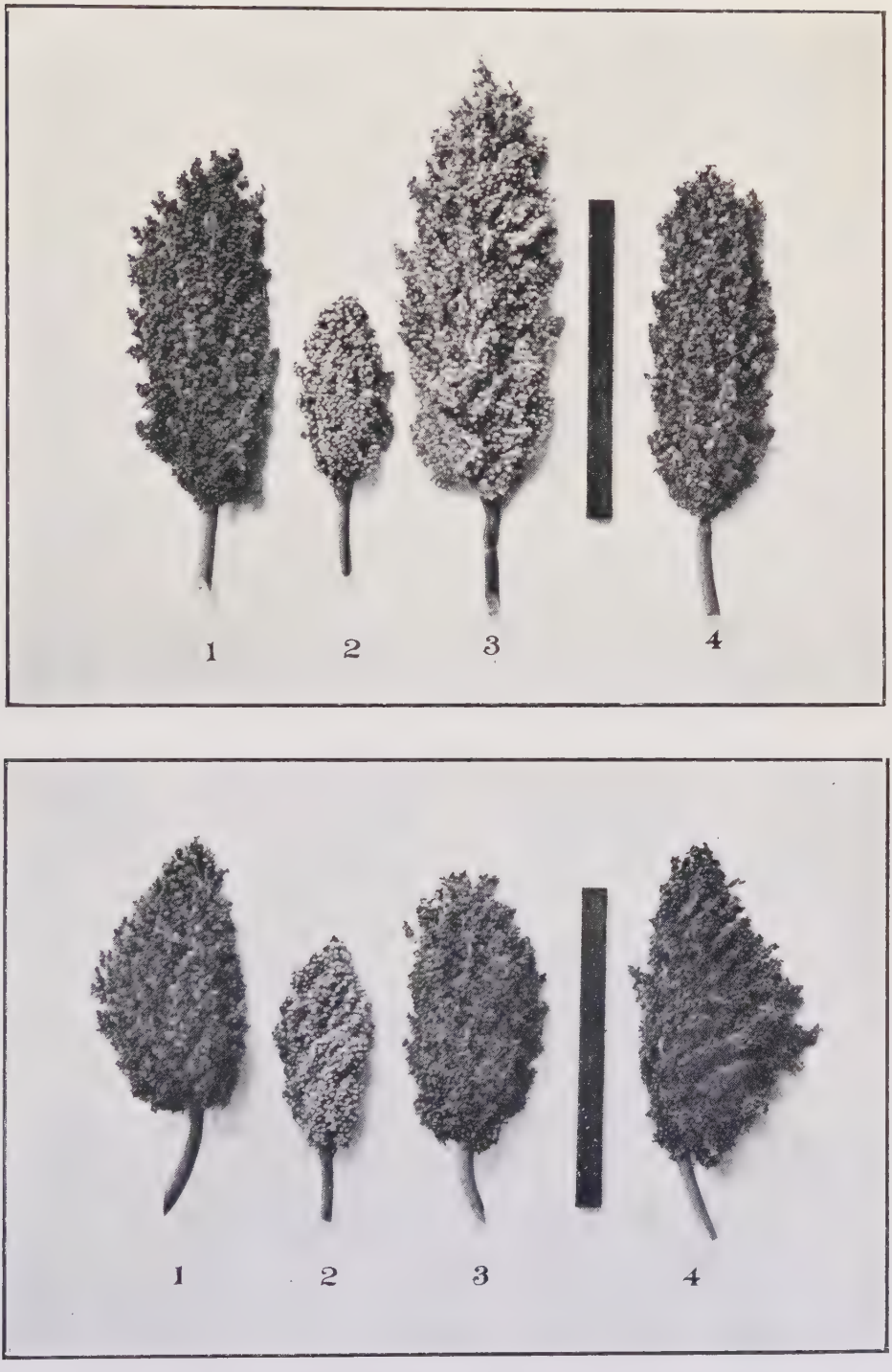


Plate 23.—Types of Cross-bred Heads.

CORN-GROWING COMPETITION, 1917-18.

1. This competition will be open to all under the age of eighteen years who are residents of the State of Queensland. An entrance fee of 2s. 6d. must be forwarded to the Under Secretary with the application to enter.

2. Applications to be enrolled in the competition, containing the following particulars, must be forwarded to the Under Secretary, Department of Agriculture and Stock, Brisbane, to reach him, if possible, not later than 29th September, 1917:—

(*a*) Full name and address. (Give Christian names in full.)

(*b*) Date of birth. (Day, month, and year.)

(*c*) No. of Division in which applicant resides, and the name of the Dairy Inspector who supervises the locality.

3. The area to be devoted to the planting of the seed maize shall be one-tenth of an acre, selected seed for which, $1\frac{1}{4}$ lb. of Improved Yellow Dent, will be posted, free of cost.

4. Each competitor shall have absolute freedom in his choice of ground, and in the methods he may adopt in preparing, planting, and cultivating his plot; but in no case shall a plot exceed one-tenth of an acre. Yields will be calculated, when judging, on the basis of this area.

The following table shows the length the rows must be to give the exact area according as four, five, six or more rows are planted:—

No. of Rows Four Feet Apart.	Length of Rows in Feet.	No. of Rows Four Feet Apart.	Length of Rows in Feet.
4	272 ft. 3 ins.	8	136 ft. $1\frac{1}{2}$ ins.
5	217 ft. 10 ins.	12	90 ft. 9 ins.
6	181 ft. 6 ins.	16	68 ft.
7	155 ft. 7 ins.		

5. Each competitor will be required to keep a record chart showing the dates and particulars of the different stages of work, and these charts must be delivered, at the time of harvesting, to the officer appointed for superintending and verifying the yield, and this officer will post them on to Brisbane.

6. Within seven days from the verification of the yield from the crop, each competitor shall select, without aid from other persons, twelve uniform cobs of the maize from his crop, and forward them, with a letter of advice, to the Department of Agriculture and Stock, Bris-

bane. (The cobs should be packed in straw envelopes, commonly used in packing beer bottles, and then placed tighly in a case which should be labelled and branded with the initials of the competitor and the number allotted to his district.)

7. Competitors must notify the Dairy Inspector for the district of the date when the crop shall have matured and be ready for inspection. *Unless this rule is observed the competitor will be disqualified.* The maize must be thoroughly dry and ripe when harvested.

8. No competitor shall be allowed to employ or permit any labour upon the competition plot standing in his name, other than his own personal labour, excepting in relation to the driving of horses, for which, owing to circumstances, such help may be needed.

9. The competition will close on the 30th June, 1918, and the prizes will be allotted thus:—

The competitors will be grouped according to the following divisions:—

(1) The district supervised by—
Mr. E. W. Ladewig, Dairy Inspector, Beenleigh.
Mr. H. C. Gordon, Dairy Inspector, Harrisville.
Mr. R. K. Henderson, Dairy Inspector, Rosewood.

(2) The district supervised by—
Mr. C. C. Pickering, Dairy Inspector, care of Miss Macpherson, Montague road, South Brisbane.
Mr. R. G. Ridgway, Dairy Inspector, Ellerslie Crescent, Taringa, Brisbane.
Mr. R. Winks, Dairy Inspector, Gympie.
Mr. J. A. Midgley, Dairy Inspector, Bundaberg.
Mr. W. S. Harding, Dairy Inspector, Esk.

(3) The district supervised by—
Mr. J. H. Barber, Dairy Inspector, Crow's Nest.
Mr. J. P. Carey, Dairy Inspector, Gatton.

(4) The district supervised by Mr. S. K. Crowther, Dairy Inspector, Kingaroy.

(5) The district supervised by—
Mr. J. J. Carew, Dairy Inspector, Russell street, Toowoomba.
Mr. L. Verney, Dairy Inspector, Newtown, Toowoomba.
Mr. J. R. D. Munro, Dairy Inspector, Warwick.

(6) The district supervised by Mr. D. Downs, Dairy Inspector, Gayndah.

(7) The district supervised by—
Mr. J. Cattanach, Dairy Inspector, Dalby.
Mr. R. S. Sigley, Dairy Inspector, Roma.
The Stock Inspector, Goondiwindi.

(8) The Central District of Queensland, including that supervised by Mr. L. Moriarty, Dairy Inspector, Rockhampton.

(9) The Northern district of Queensland, including that supervised by—
Mr. G. A. Smith, Dairy Inspector, Mackay.
Mr. S. A. Clayton, Dairy Inspector, Yungaburra.

10. Three special prizes of the value of £10, £5, and £3 will be awarded to the competitors who stand first, second, and third in the entire competition.

District Prizes.—1st, £5; 2nd, £2; 3rd, £1.

If there are less than six competitors, prizes will be allotted as follows:—

Four or five competitors (inclusive), two prizes, first and second.

Two or three competitors (inclusive), one prize only, first.

When only one competitor, he or she will be debarred from participating in the District Prize, but will be eligible to compete for the Special Prizes.

Note.—It is in the interest of the Entrants to encourage others to compete for the valuable prizes being offered.

No money prizes will be given, but each successful competitor will be allowed to select some article to the value of his prize.

No prize will be awarded unless the yield of corn equals twenty bushels per acre. This stipulation may be waived under very exceptional circumstances in the case of a lower yield.

11. The aggregate points will be 100, and the judging will be based upon the following:—

(*a*) Yield of plot	75 points
(*b*) Quality of maize produced	15 points
(*c*) Notes and records of plot	10 points

12. The Director of Agriculture will be the sole judge of the competition, and his decision shall be final.

WILLIAM LENNON,
Secretary for Agriculture and Stock.

Brisbane, 3rd September, 1917.

MARKET GARDENING.

HERB-GROWING.

BELLADONNA.

Amongst the herbs which might be profitably grown in the coast lands and high lands of Queensland where the autumn temperature does not rise much above 80 degrees F., is Belladonna, also called Dwale, or Deadly Nightshade (*Atropa Belladonna*), a tall, bushy herb of the natural order *Solanaceae*, growing to a height of 4 feet or 5 feet, having leaves of a dull-green colour, with a black shining berry fruit, about the size of a cherry, and a large, tapering root. The plant is a native of Central and Southern Europe. The entire plant is highly poisonous, and accidents have occurred through children and unwary persons eating the attractive-looking fruit. The leaves and roots are largely used in medicine, on which account the plant is cultivated, chiefly in South Germany, Switzerland, and France. Both roots and leaves contain the poisonous alkaloid Atropia. The percentage of Atropia in the roots ranges between 0.6 and 0.25, the roots of the young plants being always richest in the alkaloid. The percentage found in the leaves is much more uniform, being about 0.47, and extracts and tinctures of the leaves are therefore of much more constant strength than if prepared from roots.

The Uses of Belladonna.

Preparations of belladonna and atropia are used in medicine as anodynes in local nervous pains, and atropia is frequently hypodermically injected, but rarely taken inwardly. They are also of great value in ophthalmic practice on account of their peculiar property of producing dilatation of the pupil, either when painted around, or dropped into the eye. Belladonna is also used as an antispasmodic in whooping-cough and spasmodic coughs generally, and for various other medical purposes.

The following notes on the cultivation of the plant in California are published in Bulletin No. 275, December, 1916, University of California Press, Berkeley:—

"The soil on which the experiments were made consisted of a rich adobe and sedimentary loam, on which big crops of tomatoes had been grown for the two previous years. Seeding in the open proved a failure; seeds were therefore sown in cold frames, and they germinated in from six to over ten weeks. Although the temperature fell to below 27 degrees F. on two or three occasions, only some of the leaves of the young plants were killed, but the roots were unharmed. The plants were set out in the field in May, 1908, and in May, 1909, were ready for the first harvest. Owing to the dry, unfavourable season, the crop was light, and in July amounted to 355 lb. of perfectly dry and brittle belladonna from 1½ acres. A second crop was cut from plants of two seasons' growth, and brought the total, from 1½ acres, to 800 lb. of dry leaves and stems.

Although a shade plant, it thrives well in the open localities, having cool nights and considerable atmospheric moisture. Seedlings require abundant soil moisture, but when they are well rooted, soil moisture is not so essential.

Where the winter is not too severe, two, and perhaps three, crops can be gathered in one season. Extremely hot weather is harmful unless there is ample irrigation. A temperature which does not rise much above 80 degrees F. is best for the growth of the plants. Sunlight is even more important than temperature. Good, rich, well-tilled soil receiving 20 to 30 inches during the winter months, will ensure a good crop.

Belladonna is improved in yield by fertilisers. Lime appears to increase the alkaloidal content. The land should be ploughed to a depth of 9 inches, then crossed twice with the disc harrow.

The seeds may be obtained from America, but at the present war-time, not from Europe. The price per lb. is £4. The seeds are smaller than lucerne seeds. If kept in a dry place, they will retain their germinating power undiminished for three, and even four, years.

Transplanting.—Take up the seedlings. Cut off the dead tops and leave about 6 inches of the main root, with such side roots as may be present. In the field, cut a hole deep enough to receive root and crown, leaving only the dead stem remnant projecting above the surface of the soil. The crown part should be well covered, at least to the depth of an inch. Cover the roots and crown with fine soil, and tamp in the loose soil with the flat of the spade or hoe.

When transplanting the crown cuttings, the crowns are taken from the heeling-in bed and trimmed if necessary, the larger ones being cut into from two to five pieces. The smaller, single-rooted crowns are not divided. These cuttings are planted vertically and covered to a depth of three inches.

Cultivation.—Cultivation for the removal of weeds during the growing season depends, of course, upon the season and the growth of weeds. Certainly, no less than five or six cultivations should be made to keep the soil in good tilth, and as soon as the plants are large enough, the soil may be turned more and more towards the plants.

Irrigation.—As a general rule, irrigation is not required during the second, third, or fourth years.

Harvesting.—The herb is cut at the time of maximum flowering, at intervals between the first and second cutting, of three months. Heaps of four rows may be made if drying is done in the field. The stems should be cut at from 4 to 6 inches above the soil. It takes from five to six weeks for the herb to dry in the field, but a better plan is to leave the plants in the field for five or six days and then to dry them in a kiln at a temperature of about 120 degrees F.

If all the drying is done in the field, the heaps should be turned several times a week in the early morning before the leaves and small

branches have become brittle. When the leaves and all parts of the stem are brittle, they should be placed in a barn, where they should remain for another week or two preparatory to baling.

Baling the Herb.—When the herb is entirely dry, it is pressed into bales of 100 to 125 lb. each, either by means of a hand-power hay press, or by the usual horse-power. The bales are wired like hay or straw bales.

Harvesting the Roots.

So far, we have dealt with the harvesting of the leaves and steams of the plant. At the end of the fourth season, immediately after the second crop of tops (herb) has been cut, the roots, with the crowns, are taken up, usually by a plough such as is used for ploughing up sugar beets. They are then hauled to the drying place where the crowns, with about 3 inches of root, are removed, and the roots cut into lengths of 4 or 5 inches. The larger roots are split longitudinally once or twice.

Heeling-in the Crowns.—An area of ground is levelled, the soil being then removed to a depth of several inches. Set in the crowns as closely as possible and cover with soil to a depth of 2 inches. Here they remain until transplanting time. They should be lightly watered to keep them from drying out.

Drying the Roots.—The clean cut and sliced roots are spread on a board floor or hurdles to dry in the sun or in the kiln. If sun-drying is done, they should be raked together each night, and covered to keep out moisture. Sun-drying will take from three to four weeks. Kiln-drying at 120 degrees F. is preferable. Dried roots are packed and shipped in boxes or in sacks.

Roots and crowns are taken up once every four years. Four-year roots are not of as high quality as third-year roots.

Yield per acre.—As with other crops, the yield is variable. The first season's crop (two cuttings of the herb) should be 1,800 lb. net, dry weight. The second season's crop should be 1 ton, and the third season should yield from 2,100 to 2,200 lb. dry weight. The fourth year should yield 2,200 lb. of the herb, and not less than 1,000 lb. of roots, both dry weight.

THE BELLADONNA MARKET.

The demand for the dry herb, leaves, and root, is quite constant and is increasing every year. The United States requires about 300 tons of the drug annually. The European War has cut off the foreign supply almost completely, and as a result, the price has risen from about 12 cents (6d.) per lb. to one dollar (4s. 2d.) per lb. at wholesale.*

The Wholesale Market.—The grower should get in direct touch with the wholesale users of belladonna. There is no need of a middle man. One American manufacturing house uses over 80 tons of dried

* Belladonna was quoted in London in July, 1917, for leaves at 7s. 1d. per lb. wholesale.

drug every year. A grower should send samples (about 1 lb. of an average lot) to be submitted for chemical assay.

The Retail Market.—The retailers require leaves rather than stems, and it would not be possible to market hand-picked leaves profitably for less than 5s. per lb. (the present war-price is nearly 15s. per lb.).

Field Enemies of Belladonna.

The enemies of belladonna are few. Amongst them are the cut-worm, root-rot, aphis, squirrels and gophers (ground squirrels). The aphis made its appearance on plants grown in the shade. None have been found on sun-grown plants. Sunburn of leaves does very slight damage. A wilting and browning of the basal leaves is usually an indication that it is time to cut the crop.

Mr. E. N. Ward, Superintendent of the Botanical Gardens, Sydney, in an article in the September issue of the "Agricultural Gazette" of New South Wales, describing a new drug plant (*Solandra longiflora*), which produces a valuable drug to which the name of "Solandrine" has been given, says—"It has the same active principles as 'atropine' which is produced from the leaves and roots of *Atropa belladonna,* or 'Deadly Nightshade.' But Atropa is difficult to grow in New South Wales, and it is a question whether, when it is grown, the leaves and roots when assayed for drug purposes will prove payable, for even in England, where the plant is largely grown, the uncultivated is preferable to the cultivated plant, whereas the Solandra will grow easily and quickly wherever West Indian plants will grow, which is almost anywhere inland and coastal where frost is not continuous and snow does not remain on the ground. The best method of propagation is by cuttings, for those root freely. The cuttings should be taken at the end of May from flowering 'wood,' just after flowering is over. The wood is then not too soft and not too hard. The cuttings should be put in nursery rows, in light, sandy soil, well drained, and when the ground where they are to be planted has begun to get warm in late spring they will be sufficiently rooted to plant out.

"When this new drug Solandrine becomes more widely known there will be a substantial demand for solandra leaves, and it will be a pity if growers of drug plants in New South Wales should be found still struggling with the cultivation difficulties, for belladonna leaves and roots will be largely superseded by the more valuable, and far more easily produced, *Solandra* leaves."

Mr. Ward mentions that by constant pruning it can be grown as a dwarf shrub, but if left unpruned it will make a rampant climber. One plant growing in Rose Bay at the foot of a Norfolk Island pine, 100 feet high, has grown to the top of this tree and flowers profusely from its branches. It is an accommodating plant, as it grows well in the driest and most hungry places, and does not appear to object to gross feeding. It makes an excellent hedge, but must not be planted where live stock can reach it, for it belongs to that most poisonous of plant families, *Solanaceæ,* and its tribe is Atropeæ.

Pastoral.

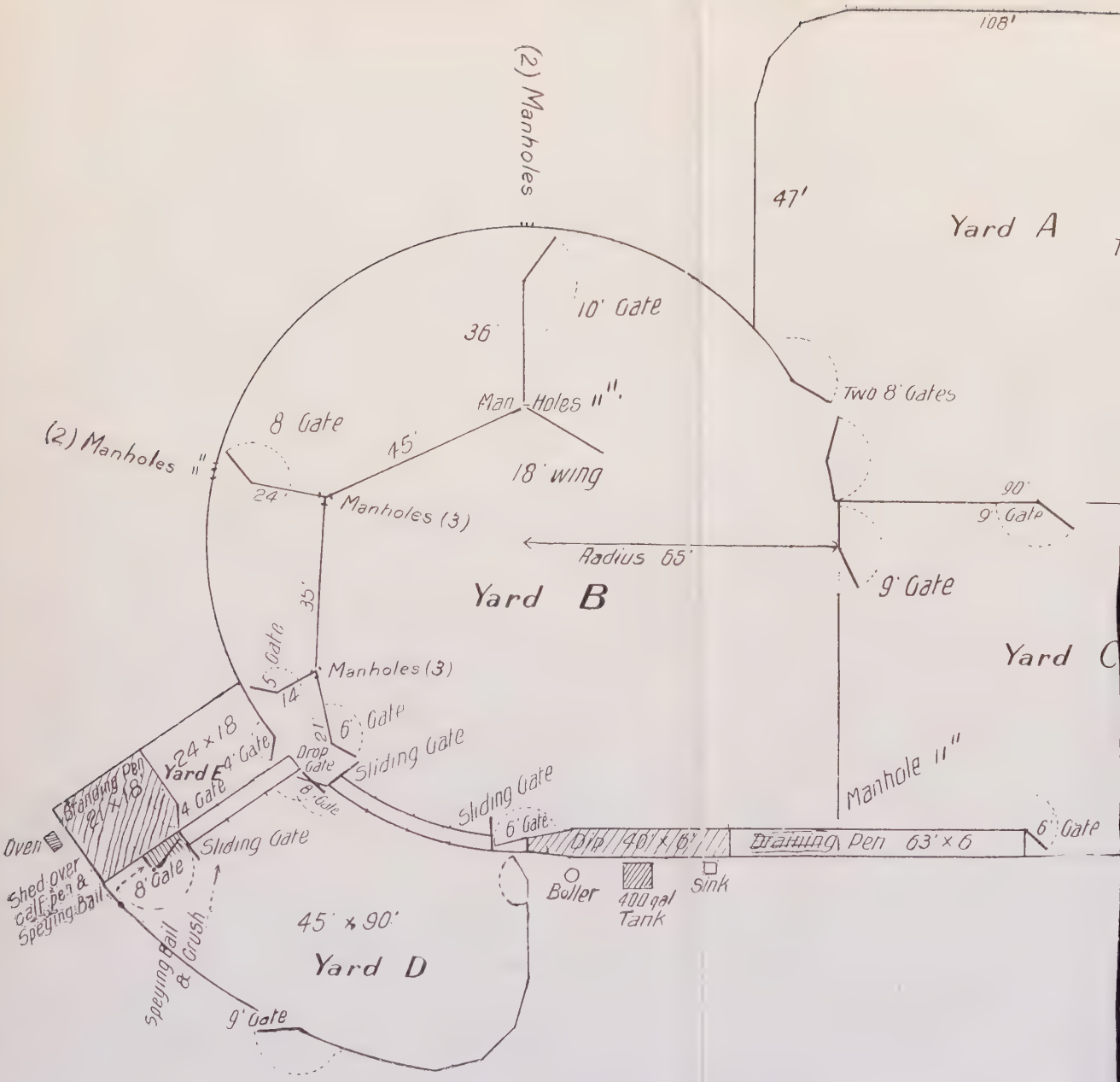
BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	4	38	Ayrshire Herd Book of Queensland
		..	2	Ayrshire Herd Book of Scotland
		2	9	Holstein-Friesian Herd Book of Australia
		2	31	Jersey Herd Book of Queensland
J. W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..	6	31	Queensland Jersey Herd Book
A. J. McConnel ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
A. Pickels	Blackland's Stud Farm, Wondai	4	62	Illawarra Dairy Cattle Herd Book of Queensland
G. C. Clark	East Talgai, Ellinthorp	3	7	New Zealand Herd Book
H. D. B. Cox	Sydney (entered brother's name)	3	16	Commonwealth Standard Jersey Herd Book
J. T. Perrett and Son	Coolabunia	2	36	Illawarra Herd Book of Queensland
State Farm	Kairi	4	8	Ayrshire Herd Book of Queensland
		1	2	Holstein-Friesian Herd Book of Australia
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Australian Hereford Herd Book
W. F. Savage	Ramsay	1	12	Illawarra Herd Book of Queensland
Tindal and Son ..	Gunyan, Inglewood	50	400	Australian Hereford Herd Book
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Queensland Jersey Herd Book
J. H. Fairfax	Marinya, Cambooya (2)	9	55	Ayrshire Herd Book of Queensland
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
J. Holmes	"Longlands," Pittsworth	6	20	Ayrshire Herd Book of Queensland
P. Biddles	Home Park, Netherby	1	20	Illawarra Dairy Cattle Association
A. Rodgers	Torran's Vale, Lanefield	1	9	Milking Shorthorn Herd Book
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	..	Holstein-Friesian Herd Book of Queensland
		2	..	Holstein-Friesian Herd Book of Australia
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	1	2	Queensland Jersey Herd Book
Ditto	ditto	..	6	Commonwealth Standard Herd Book
H. M. Hart	Glen Heath Stud, Yalangur	7	21	Ayrshire Herd Book of Queensland



GROUND PLAN OF CATTLE YARDS AND DIP FOR BRANDING, WEANING, SPEYING, INOCULATING, AND DIPPING; TO

When the Yards are only required for Dipping, Yards D and E are omitted. For Dipping small numbers of Dairy Cattle, Yar

Plan of Yards drawn by Mr. E. D. WHITE (of Messrs. W. D. White and Sons), Bluff Downs, Charters Towers, where and 22,000 Head of Cattle regularly Dipped.

Hold 800 Head.

s A and C may also be omitted.

there are Nine Dips

DIPPING CATTLE.

OPINION OF AN EXPERIENCED CATTLEMAN ON AN UNFENCED HOLDING CARRYING 17,000 CATTLE AND WORKING EIGHT DIPS.

It is over twenty years since ticks first made their appearance on the Burdekin waters, when we lost up to 60 per cent. of our cattle from tick fever. Those that survived, and their progeny, became immune to the fever, and this immunity remains with the cattle on all country that continues to be badly infested with ticks. So there are practically no losses from fever now. But the extent of the loss we sustain annually through tick worry is not generally realised. Although most cattle stations now have dips, with very few exceptions, no systematic and methodical attempts have been made to deal effectively with this pest.

After ten years' trial here we can emphatically say that in badly infested areas no investment offers such a reliable and quick return as money spent on dips and dipping.

To gauge in some degree the extent of the loss we are sustaining, compare the number of cattle carried on these runs before and after the coming of the tick. The average now is about half of that formerly. Convert that into terms of money to realise the loss to the community and State.

It is impracticable at the present time to talk of eradication, because of the impossibility of getting financial aid from the State and the high cost of fencing. But the Americans have proved it possible by clearing 475,000 square miles between 1906, when the work was undertaken there seriously, up to March, 1916. This task must be faced by us later, and because the conditions we will have to work under may make this harder, it cannot be shelved indefinitely on that score.

However, what concerns us vitally in the meantime is the necessity of suppressing the ticks and doing away with much of the poverty and mortality to stock now being caused by them. To undertake this work each one making the attempt will very soon have his own experience to guide him, but a few suggestions may not come amiss to those about to start.

First, put in a good wide dip 6 feet across at water line. This reduces all risks of cattle injuring each other to a minimum and has every advantage over the narrow dip when working big mobs of cattle. With a good incline and big wide steps on the walk out, the weakest cattle can be dipped with little risk. The draining yard should be long and from 8 to 12 feet wide. The cattle walk to the far end and stand quietly without horning and knocking each other about. Dips should be arranged in such positions on the run so the cattle will not be driven more than 7 or 8 miles.

The number of cattle that can be worked through one dip depends entirely on the carrying capacity of any particular area. But on the Tableland, so far, we have found about 2,000 the limit without having to drive too far. How often cattle should be dipped depends upon the

nature of the country, for whereas on certain runs on the Upper and Lower Burdekin it is found necessary to dip every three weeks through the year, there are other places within the tick infested area that find an occasional dipping suffices. In this men must be guided by their own experience. It is a bad policy to wait until the hair is coming off the cattle. Taking this Tableland country, we find that after a good burning in the spring and rain following in November and December the ticks are not much in evidence until the following April. It is not possible to dip regularly during the first three months owing to wet weather, but by April the wet season is usually over. This is the time, and from this on to July one can get good results from dipping. This is the very best time to work stock. The grass is good, everything strong, and the weather cool, and the ticks, if unchecked, are increasing at a great rate. Don't delay until the country is infested; catch them early while the cattle are strong and healthy, and keep the ticks off and the condition on, and give the breeders a chance to weather a severe winter and dry spring. One dipping then is worth more than four in August.

It is often contended that the losses from dipping weak cattle outweigh any gain. Our experience is quite the reverse. We never stopped dipping all through the 1915 drought, and not ten head stopped in the dip. Each dipping gave them a new lease of life, and we saved most of our breeders by it. Others say it is impossible to dip bullocks while fattening. This is wrong. It not only quietens them and makes them better to drove, but improves their condition and weight. It is not advisable to put cattle on the road immediately after dipping. They should have at least five days' rest in paddocks. Calves can be dipped from two weeks of age upwards, but the strength of the dip should be less than the accepted standard, to avoid any risk of loss.

As to the extra cost dipping entails, though almost as much benefit can be derived from dipping on big unfenced runs, better results can naturally be obtained where they are subdivided and not more than 1,000 to 1,500 cattle carried in one paddock. This allows the mustering to be done cleanly and systematically. Where eight stockmen used to look after up to 20,000 clean cattle formerly with fair success it requires treble the hands, at least, to work and dip effectively that number now. Six men can attend to 3,000 or 4,000 head. Bullocks require about one-third the attention that breeders do. Where no shoeing of horses is done (which involves a big addition to the work on basalt country) this estimate may not apply.

Now to meet this big increase in working stock under these conditions: Allow we save half the cows that die on the average annually from tick worry. This mortality on the Tableland is about 80 per cent. of the total females branded each year. The balance of 20 per cent. (over

the actual number if returns were forthcoming) are those cows sold and killed for beef. On a holding branding 2,000 calves, instead of turning off 200 cows, which very few do in that proportion, they should be marketing at least 500. These extra 300 cows alone at present values would more than compensate for all extra expenditure incurred. Then take into consideration the holding would carry 50 per cent. more stock with all the additional returns for an increased turn off and better class of bullocks.

E. E. D. WHITE,
Bluff Downs.

PURIFYING WATER FOR STOCK.

A simple method of purifying almost any water for drinking without boiling has been worked out by Dr. G. G. Naismith, director of the Health Laboratories of Toronto, Canada, and Dr. R. R. Graham, Assistant Chemist. The process is as follows:—Add a teaspoonful (not heaped up) of chloride of lime, containing about one-third available chlorine, to a cupful of water. Dissolve, and add in any convenient receptacle three more cupfuls of water. Stir and allow to stand for a few seconds in order to let the particles settle. This stock solution, if kept in a tightly stoppered bottle, may be used for five days. Add a teaspoonful to two gallons of water to be purified; stir thoroughly in order that the weak chlorine solution will come into contact with all the bacteria, and allow to stand for ten minutes. This will effectually destroy all typhoid and colon bacilli, or other dysentery producing bacilli in the water. The water will be without taste or odor, and the trace of free chlorine added rapidly disappears.

Water containing mud in suspension is easily clarified by dropping hot wood ashes into it, or by the application of lime or alum. These two substances make the water hard. Chloride of iron may also be used. It is quite harmless, and a valuable constituent for all animals. Medical men prescribe iron in one of its several forms as a tonic. One pound of chloride of iron (2d. per lb.) will clarify 1,000 to 2,500 gallons of muddy water, and much reduce the bacterial contents.

MUSHROOM KETCHUP.

Put mushrooms into large earthenware basin, sprinkle with plenty of salt. You may keep adding mushrooms for two or three days, and sprinkle more salt over them. Boil mushrooms and their juice for half an hour, strain, and for each quart of juice add ½-pint of vinegar, 1 teaspoon black pepper, ¼-spoon cayenne, some peppercorns, tablespoon sugar, cloves, a little bruised whole ginger. Boil 1 hour. Strain again, and bottle while hot.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

Milking Returns of Cows from 28th July to 27th August, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Auntie's Lass	Ayrshire	5 July, 1917	1,239	4·0	58·2	
College Damsel	Holstein	12 July ,,	1,127	3·9	51·58	
Netherall Queen Kate	Ayrshire	30 June ,,	1,066	3·8	47·50	
Lilia ...	,, ...	11 July ,,	1,076	3·6	45·41	
Lady Melba	Holstein	14 Feb. ,,	931	3·6	39·28	
Confidence...	Ayrshire	25 June ,,	774	4·0	37·34	
Lady Margaret	,, ...	6 Jan. ,,	663	4·5	35·13	
Miss Security	Jersey	27 Mar. ,,	611	4·7	33·85	
Miss Bell ...	,, ...	27 June ,,	563	4·6	30·51	
Lady Prim...	Holstein	3 Aug. ,,	761	3·3	29·32	
Netherton Belle	Ayrshire	17 July ,,	695	3·6	29·31	
Princess Kate	,, ...	28 June ,,	629	3·8	28·02	
Lady Loch II.	,, ...	3 June ,,	612	3·9	28·00	
Buttercup ...	Shorthorn... ...	2 June ,,	685	3·4	27·20	
College Bluebell	Jersey	28 June ,,	723	3·2	26·98	
Glade ...	Shorthorn... ...	29 Mar. ,,	414	5·5	26·93	
Sweet Meadows	Jersey	8 Aug. ,,	370	5·6	24·50	
Hedges Madge	Holstein	22 Mar. ,,	551	3·7	23·88	
Iron Plate ...	Jersey	9 Dec., 1916	430	4·6	23·30	
Rosine ...	Ayrshire	21 June, 1917	557	3·1	20·12	

EXPERIMENTS WITH PEPSIN TO REPLACE RENNET.

D. W. STEUART, B.Sc. (University College, Cardiff.)

In view of the shortage and high price of rennet, the Agricultural Department of University College, Cardiff, decided to give pepsin a trial. A London firm kindly sent 1 oz. of their 1-3,000 soluble pepsin powder for that purpose. From this it was desired to produce a solution which would be as similar as possible in composition and strength to standard rennet extract, which could be used in exactly the same way as rennet, and which would keep. A 10 oz. dark-coloured bottle (a "poison" bottle from the druggist's) was thoroughly washed and scalded, then allowed to cool, and the 1 oz. of pepsin powder put into it. Then 50 grammes of salt, 5 grammes of boric acid, and 250 grammes of water were brought to the boil in an Erlenmeyer flask (water and salt often contain germs, so this treatment was necessary.) The brine was cooled to 105 degrees F., put into the bottle, corked with a new cork, the whole

shaken violently, and then, without any preliminary filtering, sent to the dairy to be tested. Miss Annie Pritchard, N.D.D., reported as follows: The solution gave a 17-18-second rennet test as against 22 seconds with rennet extract. On standing a sediment settled. When shaken up for use the solution was very cloudy. The pepsin solution was tested against rennet on four different days for making Caerphilly cheese. The pepsin acted in about 7 minutes, and the curd was ready to cut in 45 minutes; the rennet acted in about 15 minutes and the curd was ready to cut in an hour. Even then the pepsin curd was always the firmer when cut. Taking the four tests together, 16½ gallons of milk gave 18 lb. 9 oz. of curd with rennet, but 19 lb. 11 oz. of curd with the pepsin. The pepsin curd was therefore moister, due to the curd being firmer when cut. What remained of this unfiltered pepsin solution at the end of two months gave even a quicker rennet test, proportionately, than when it was new, showing that it had become somewhat stronger.

The solution was examined bacteriologically at the end of the first month. To three Durham's tubes containing MacConkey's litmus, lactose, bile salt, and peptone water, 1 c.c., 1/10th c.c. and 1/100th c.c. of pepsin solution were added, respectively, and the tubes were incubated two days at blood heat. There was no evidence of gas-producing coliform organisms. Then similar quantities of the pepsin solution were added to tubes of whey agar, plates were poured, and incubated three days at 37 degrees C. Not a single colony of germs developed, suggesting that the solution was almost or quite sterile.

A second ounce of soluble pepsin powder was purchased for 1s. 9d., and made up as before, but in the following proportions: 1 oz. pepsin, 68 grammes salt, 7 grammes boric acid, and 340 grammes water.

The whole was shaken violently. Next day the shaking was repeated. On the second day the solution was filtered through filter paper. The filtering took about 24 hours. The fluid was bottled as before and sent to the dairy.

Miss Pritchard's report this time was to the effect that the solution was fairly clear and showed no sediment. It gave practically the same rennet test as the rennet. It was compared with rennet for making Caerphilly, Smallholder and soft cheeses (Bondons, Pont L'Evéques, and Coulommiers). The results were entirely satisfactory, the pepsin solution and rennet being of equal strength and having the same effect.

A pair of Caerphilly cheeses made on 20th February, each from 2 gallons of milk, were sampled on 8th March. The two cheeses differed in weight only by an ounce. There was practically no other difference between the pepsin and the rennet cheese. The first batch of Caerphilly cheeses was sold to Mr. Richard Thomson of the Direct Trading Company at 160s. per cwt., the then ruling price for first quality Caerphilly. On the 22nd of March, Mr. Thomson examined the cheeses and considered all of them to be entirely satisfactory. Three pairs of cheeses made on 28th February, 1st March, and 6th March, respectively, were selected, and it was explained how they differed. Mr. Thomson was unable to

detect any difference between the rennet cheese and the pepsin cheese of each pair.

The trials suggest that a gallon of rennet solution of standard strength can be made by mixing the following ingredients:—

13⅓ oz. of the firm's 1/3,000 soluble pepsin powder;

2 lb. salt;

3 oz. boric acid; and

1 gallon water.

The brine must be cooled to 104 degrees F., after boiling, before dissolving the pepsin. The solution may be filtered after a day or two. It will keep well. With pepsin at 22s. per lb., a gallon costs 18s. 6d. The makers claim that 1 oz. of pepsin powder will curdle 300 gallons of milk. This is quite correct. It takes 12 oz. of standard rennet extract to equal 1 oz. of pepsin powder.—"Journal of the Board of Agriculture," England.

PICKLING ONIONS AND GHERKINS TO PRESERVE THEIR COLOUR.

The following methods for preserving the whiteness of pickling onions and the green colour of gherkins are described in the "Agricultural Gazette" of New South Wales of August 2:—"If the white colour that is appetising and attractive in pickled onions is to be retained, spices must be omitted. Choose the smallest onions which can be found, and, to facilitate the removal of their skins, pour hot water over them. Make enough strong brine to cover the onions, and put them into this as they are peeled. Let them remain there from one morning till the next; then replace this brine with fresh, and do the same on the third morning. On the fourth morning put the onions in fresh water, and heat them to the scalding point, stirring frequently. Milk addded to the water will help to whiten the onions during the boiling. Drain well, and place the onions in a jar, pouring scalding hot vinegar over them.

The first essential to success in pickle-making is good vinegar, strong and pungent. Do not use a copper vessel in any part of the process—a porcelain-lined preserving vessel is best. Vinegar boiled in a copper vessel forms acetate of copper, which is a poison.

To retain the green colour in gherkins, add parsley to the vinegar some days before it is required, and let it steep thus. The vinegar should acquire a decided green colour which will necessarily be imparted to the gherkins.

Take 200 gherkins, cover with cold water, to which a pint of salt has been added. Let them stand overnight. In the morning drain off this water, but measure how much is poured off. Then take a similar quantity of the prepared vinegar, add 1 oz. of whole cloves, 1 oz. of allspice, and a piece of alum the size of a walnut. Boil this vinegar and the spices, and pour it, boiling hot, over the gherkins. Cover with green cabbage leaves. A few green peppers in the vinegar give additional flavour and are a great improvement.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1917.

The month of August has been favourable for egg production, 9,375 eggs being the total for the month. In the light section, E. Chester's six pullets laid the highest monthly total of 149, but as the eggs are under weight, the monthly prize goes to C. Porter, with a total of 145 eggs. In the heavy section, E. A. Smith and A. E. Walters are equal for first place with 156 eggs each. R. Burns comes next with 151, G. Richter, C. C. Dennis, and Dr. E. C. Jennings have each had a bird treated for sickness. Broodiness has been rather prevalent amongst the heavy breeds in the group pens, but in one case only in the single heavy test. No case of broodiness has been recorded in any of the light-breed pens. Mr. R. Burns's F bird, competing in the single test, has put up the fine record of 143 eggs in 151 days, laying 77 eggs in the past 77 days, and is still in lay. This probably constitutes a record for continuous production. The following are the individual records:—

Competitors.	Breed.	August.	Total.
LIGHT BREEDS.			
E. Chester	White Leghorns ...	149	639
*G. H. Turner	Do.	132	563
W. Becker...	Do.	131	555
G. Chester	Do.	137	534
F. W. Leney	Do.	143	534
C. Porter	Do.	145	531
W. R. Crust	Do.	128	531
T. A. Pettigrove, Victoria	Do.	126	515
Moritz Bros., S.A.	Do.	135	514
Oakland Poultry Farm	Do.	116	514
T. Taylor	Do.	128	497
*J. Zahl	Do.	111	488
T. B. Hawkins	Do.	126	487
*J. R. Wilson	Do.	117	486
*J. M. Manson	Do.	127	483
Kelvin Poultry Farm	Do.	138	478
J. G. Richter	Do.	120	473
Mars Poultry Farm	Do.	122	471
*A. T. Coomber	Do.	129	470
Quinn's Post Poultry Farm	Do.	133	470
*A. W. Bailey	Do.	106	465
D. Fulton	Do.	137	459
A. Shillig	Do.	140	459

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	August.	Total.
LIGHT BREEDS—*continued.*			
C. Knoblauch	White Leghorns	126	457
A. H. Padman, S.A.	Do.	111	456
*Mrs. Munro	Do.	128	447
R. Holmes	Do.	110	430
*Dixie Egg Plant	Do.	106	414
F. Clayton, N.S.W.	Do.	124	409
J. L. Newton	Do.	127	408
G. Williams	Do.	122	402
Mrs. W. D. Bradburne, N.S.W.	Do.	138	401
Miss M. Hinze	Do.	101	400
*T. Fanning	Do.	128	394
L. G. Innes	Do.	125	391
G. Howard	Do.	137	382
E. Cross	Do.	134	378
*C. C. Dennis	Do.	103	378
J. Holmes	Do.	125	373
*A. E. Walters	Do.	116	372
G. J. White	Do.	126	372
Mrs. J. Carruthers	Do.	124	364
Mrs. S. J. Sear	Do.	132	356
S. C. Chapman	Brown Leghorns	140	346
C. H. Singer	White Leghorns	121	344
E. A. Smith	Do.	124	344
C. P. Buchanan	Do.	120	336
J. Ferguson	Do.	127	335
*Dr. E. C. Jennings	Do.	99	289
HEAVY BREEDS.			
*R. Burns	Black Orpingtons	151	595
A. E. Walters	Do.	156	564
W. Smith	Do.	142	547
*Mars Poultry Farm	Do.	140	526
F. A. Claussen	Rhode Island Reds	133	520
W. S. Hanson, N.S.W.	Black Orpingtons	128	486
*E. F. Dennis	Do.	144	471
Cowan Bros., N.S.W.	Do.	132	455
D. Kenway, N.S.W.	Do.	128	455
P. C. McDonnell, N.S.W.	Do.	124	443
H. Jobling, N.S.W.	Do.	119	422
Mrs. J. H. Jobling, N.S.W.	Do.	136	415
King and Watson, N.S.W.	Do.	112	380
*Oakland Poultry Farm	Do.	145	375
*E. A. Smith	Do.	156	364
R. Burns	S. L. Wyandottes	134	358
F. Clayton, N.S.W.	Rhode Island Reds	116	357
C. B. Bertelsmeier, S.A.	Black Orpingtons	129	357
E. Morris	Do.	140	353
*Kelvin Poultry Farm	Plymouth Rocks	134	324
C. C. Dennis	White Wyandottes	116	323
J. M. Manson	Black Orpingtons	146	320
*Miss M. Hinze	Do.	141	315
*F. W. Leney	Rhode Island Reds	123	281
Totals		9,375	31,600

* Indicates that the pen is entered in the single hen test.

DETAILS OF SINGLE HEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
G. H. Turner	76	87	111	101	85	103	563
J. Zahl	98	69	102	36	105	78	488
J. R. Wilson	90	79	73	87	84	73	486
J. M. Manson	86	77	69	74	81	96	483
A. T. Coomber	90	30	94	89	75	92	470
A. W. Bailey	36	68	92	91	89	89	465
Mrs. J. R. D. Munro	110	67	66	65	46	93	447
Dixie Egg Plant	72	83	84	90	85	0	414
T. Fanning	38	73	77	71	56	79	394
C. C. Dennis	72	63	18	72	75	78	378
A. E. Walters	37	57	57	75	83	63	372
Dr. E. C. Jennings	20	28	54	65	84	38	289
R. Burns	73	64	106	86	123	143	595
Mars Poultry Farm	80	104	76	99	85	82	526
E. F. Dennis	81	71	93	96	99	31	471
Oaklands Poultry Farm... ...	95	53	52	42	93	40	375
E. A. Smith	56	49	49	93	63	54	364
Kelvin Poultry Farm	61	45	42	96	31	49	324
Miss M. Hinze	57	45	52	58	60	43	315
F. W. Leney	44	46	21	42	89	39	281

Weights of Eggs.

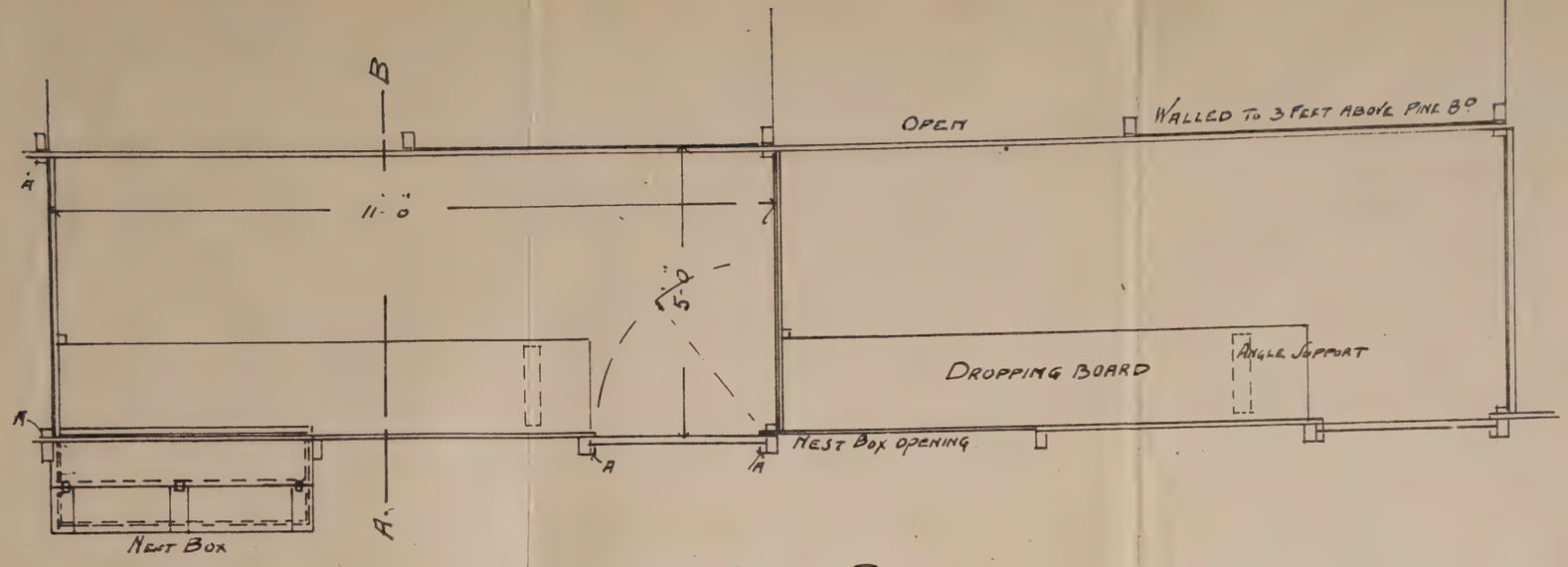
In accordance with the rules of the competition, the eggs of the birds have been weighed. In regard to this, weather conditions were unfavourable when the weighings were taken at the end of July, a high westerly wind blowing continuously for the most of the week. On this account a second weighing was carried out at the end of August for those whose eggs had been under weight in the first instance. In the group pens twelve or more eggs were weighed where possible, and for the single hens the object was to secure at least six eggs before the average was struck. It is very disappointing to find that so many are

below the standard of 24 oz. per dozen. The following table of results show the weight of the eggs to the nearest eighth of an ounce:—

Pen.	Competitor.	Average Weight per Egg.	Pen.	Competitor.	Average Weight per Egg.
		Ozs.			Ozs.
1	Miss Hinze	2 1/8	28	R. Holmes	2 1/4
2	W. Thomas (Quinn's)	2	29	W. Becker	2
3	F. W. Leney ...	1 3/4	30	C. P. Buchanan ...	2
4	Moritaz Bros. ...	2	31	Mrs. Carruthers ...	2 1/8
5	T. B. Hawkins ...	2	32	G. Williams	2
6	G. W. Holland ...	2 1/4	33	Mars Poultry Farm	2 1/8
7	C. Porter	2	34	A. Shillig	2
8	T. A. Pettigrove ...	2	35	G. Howard	1 3/4
9	E. A. Smith	2	36	G. J. White	2 1/8
10	C. Knoblauch ...	1 7/8	37	J. H. Newton ...	1 7/8
11	J. Ferguson	2 1/8	38	H. Jobling	2 1/8
12	E. Chester	1 7/8	39	D. Kenway	2
13	D. Fulton	2	40	R. Burns	1 7/8
14	C. Chester	1 7/8	41	King and Watson ...	1 7/8
15	Mrs. S. J. Sear ...	2	42	Mrs. J. H. Jobling ...	2 1/8
16	L. G. Innes	2	43	P. C. McDonnell ...	1 7/8
17	C. H. Singer... ...	1 7/8	44	Cowan Bros.	2
18	E. Cross	2	45	F. Clayton	2 1/8
19	J. Holmes	2 1/8	46	C. B. Bertelsmeier ...	1 7/8
20	T. Taylor	1 7/8	47	A. E. Walters ...	2
21	Kelvin Poultry Farm	1 7/8	48	W. Smith	1 7/8
22	W. R. Crust	2	49	E. Morris	1 3/4
23	J. G. Richter ...	1 7/8	50	J. M. Manson ...	2
24	S. C. Chapman ...	1 7/8	51	C. C. Dennis	2
25	Mrs. W. D. Bradburne	2 1/8	52	W. G. Hansen ...	2
26	A. H. Padman ...	2	53	F. A. Claussen ...	2 1/8
27	F. Clayton	2			

SINGLE HEN PENS.

No.	Competitor.	A.	B.	C.	D.	E.	F.	Group.
								Oz.
1	C. C. Dennis	2 1/8	2	2	2 1/8	2 1/8	1 7/8	2
2	J. M. Manson	2	1 7/8	2 1/8	2	2 1/8	2	2
3	Mrs. J. R. Munro ...	2	2	2	2	2 1/8	2	2
4	A. E. Walters	2	2	2 1/8	2	1 7/8	1 7/8	2
5	G. H. Turner	2 1/4	1 7/8	2	1 7/8	2 1/8	2	2
6	J. Zahl	2	2 1/4	1 7/8	2 1/8	2	2	2
7	J. R. Wilson	2	2	2 1/4	2 1/8	1 7/8	2	2
8	T. Fanning	2	2	1 7/8	2	2 1/8	2	2
9	Dixie Egg Plant	2	2	2 1/8	2 1/8	2	...	2
10	Dr. Jennings	1 5/8	2	1 3/4	2	2	2	1 7/8
11	A. W. Bailey	...	2 1/8	2 1/4	2 1/4	2 1/4	2 1/8	2 1/4
12	A. T. Coomber	2 1/8	2 1/8	1 7/8	2	2 1/8	2	2
13	Mars Poultry Farm ...	2	1 1/8	2	2	1 3/4	1 7/8	1 7/8
14	E. A. Smith	1 1/8	2 1/8	1 7/8	1 7/8	2 1/4	2	2
15	R. Burns	2 1/4	2	2 1/4	2	2 1/8	1 3/4	2 3/8
16	Kelvin Poultry Farm ...	1 3/4	2	1 7/8	1 7/8	1 3/4	1 3/4	1 7/8
17	Miss Hinze	2 1/8	2	1 7/8	2	1 7/8	2 1/8	2
18	E. F Dennis ...	1 1/8	1 3/4	1 7/8	1 3/4	1 3/4	2	1 7/8
19	Oakland Poultry Farm ..	1 3/4	1 3/4	2	...	1 7/8	2	1 7/8
20	F. W. Leney	1 7/8	2 1/8	1 7/8	1 7/8	2	2 1/8	2



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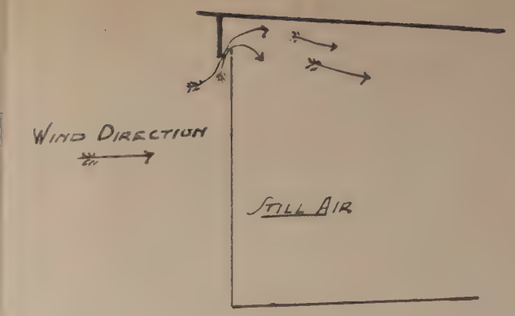
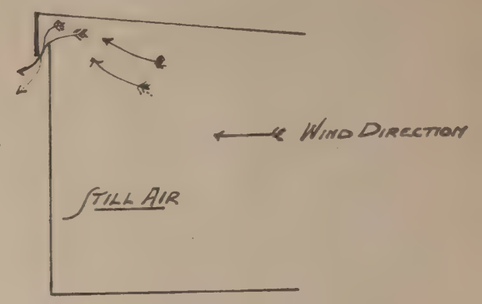
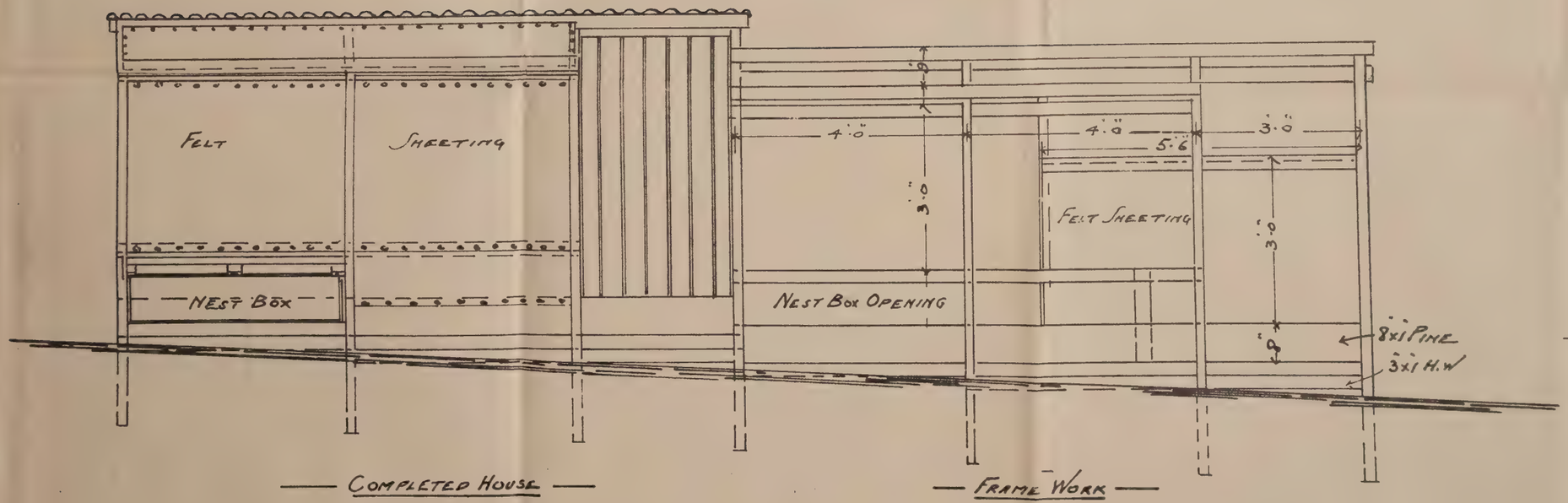


— No 5. DIAGRAMS- SHEWING VENTILATION — SYSTEM —





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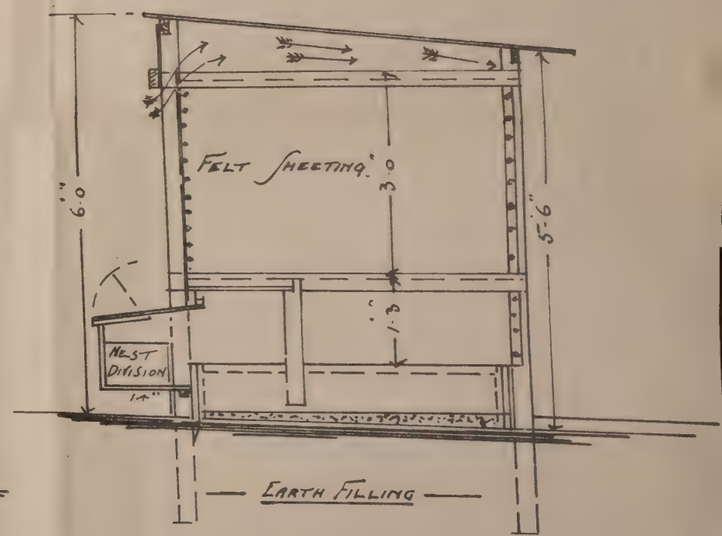
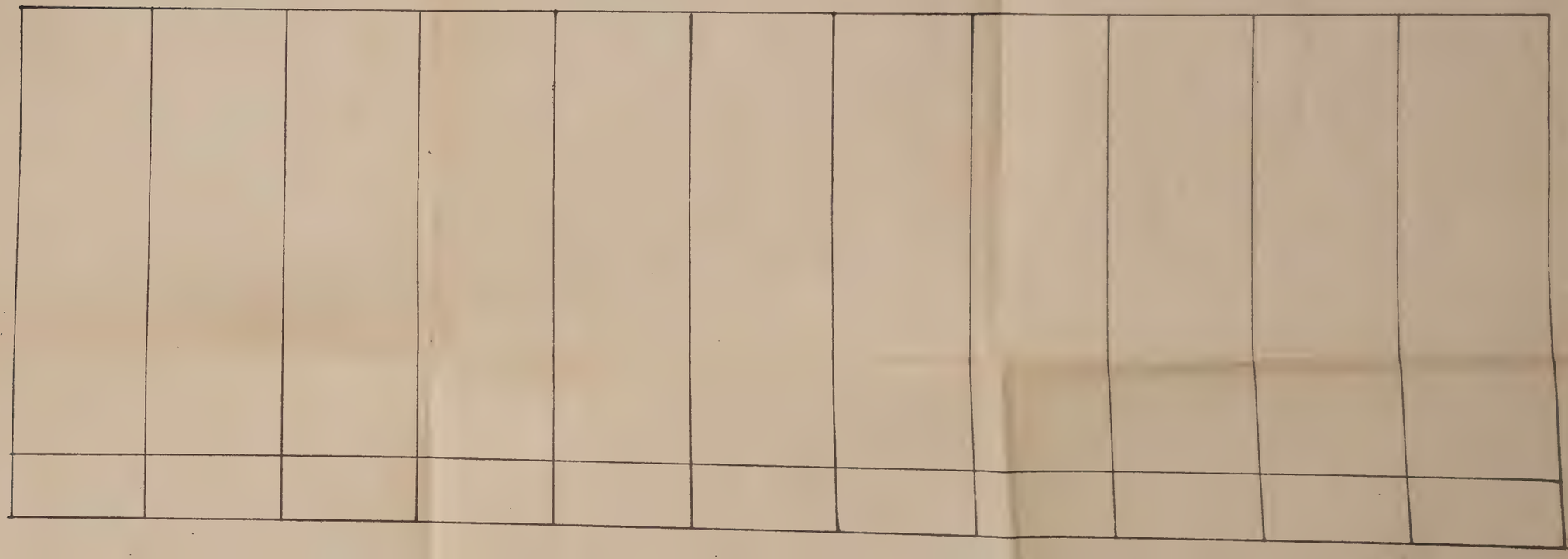


— No 4. VERTICAL SECTION ON A.B —

— PLAN SHOWING LAYOUT OF THE CONTINUOUS HOUSE SYSTEM —

— No 1. —



POULTRY BUILDING AND APPLIANCES DESIGNED AT THE QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

At the National Association's Exhibition, Brisbane, held in August, 1917, the College erected several full-size model poultry pens and had on view several useful poultry appliances. A number of novel features were embodied, and in the design the objects held in view were economy in construction, economy of labour in working, sanitation, and ventilation—all these points being considered in regard to the Queensland climate. In presenting the following plans and specifications, we quite recognise that the various designs are not perfection. Still, they are worthy of notice, and if they stimulate an interest in poultry building construction generally, they will largely have served their purpose, for we feel that it is a matter of importance for Queensland to evolve its own type of farm building, a type which must conform with our climatic conditions.

Poultry Pens.

The houses are constructed on the continuous system, the continuous back facing the weather, probably west or south-west; thus the fronts, which are only partially walled, face east or north-east. To each pen there is a small run, and the whole of the floor of each house is used as a scratching pen. All fittings, such as nest-box, dropping board, and perches, are detachable, and when removed, leave the inner walls of the house readily accessible for disinfecting. As far as possible, the houses and runs are worked from the back, and successive rows of houses are separated by lanes. (*See* Sketch No. 1.)

Construction of the Houses.

The houses shown are 11 feet by 5 feet, and are 6 feet high at the back, and 5 feet 6 inches high in front. The uprights are 3-inch by 2-inch hardwood, but may be of bush saplings. Around the bottom and on the inside of the sheds 3-inch by 1-inch hardwood battens are fixed to a distance of 2 inches or more above the ground level, so as to allow of the floor of the house being filled with good subsoil which can be wet and tamped down to a solid floor. Above the hardwood battens 8-inch by 1-inch pine boarding is fixed to retain the scratching litter. This boarding is also placed inside the studs. At the door the 8-inch board fits between fillets, and can be removed when cleaning out the litter. Above the pine boarding, 3-inch by 1-inch pine battens are fixed as follows:—At the back, extending from the door-jamb to the end of the building, the first batten is set 1 foot up, measuring to its upper edge. The second batten is 3 feet above this, both inside the studs. Half the foot interval is filled in with a foot wide strip of roofing felt, leaving the other half as an opening for attaching the external nest-box (*see* Plate). The whole of the 3-feet interval is similarly filled. The remainder is covered with a 9-inch strip of roofing felt, placed outside the studs, and attached at its upper edge to the roof plate and at its lower to a 3-inch batten fixed outside. By this means a weatherproof opening is created for ventilation. (See plan.)

This ventilation system is specially to be recommended, as the vertical opening creates a draught even on still days. With a wind

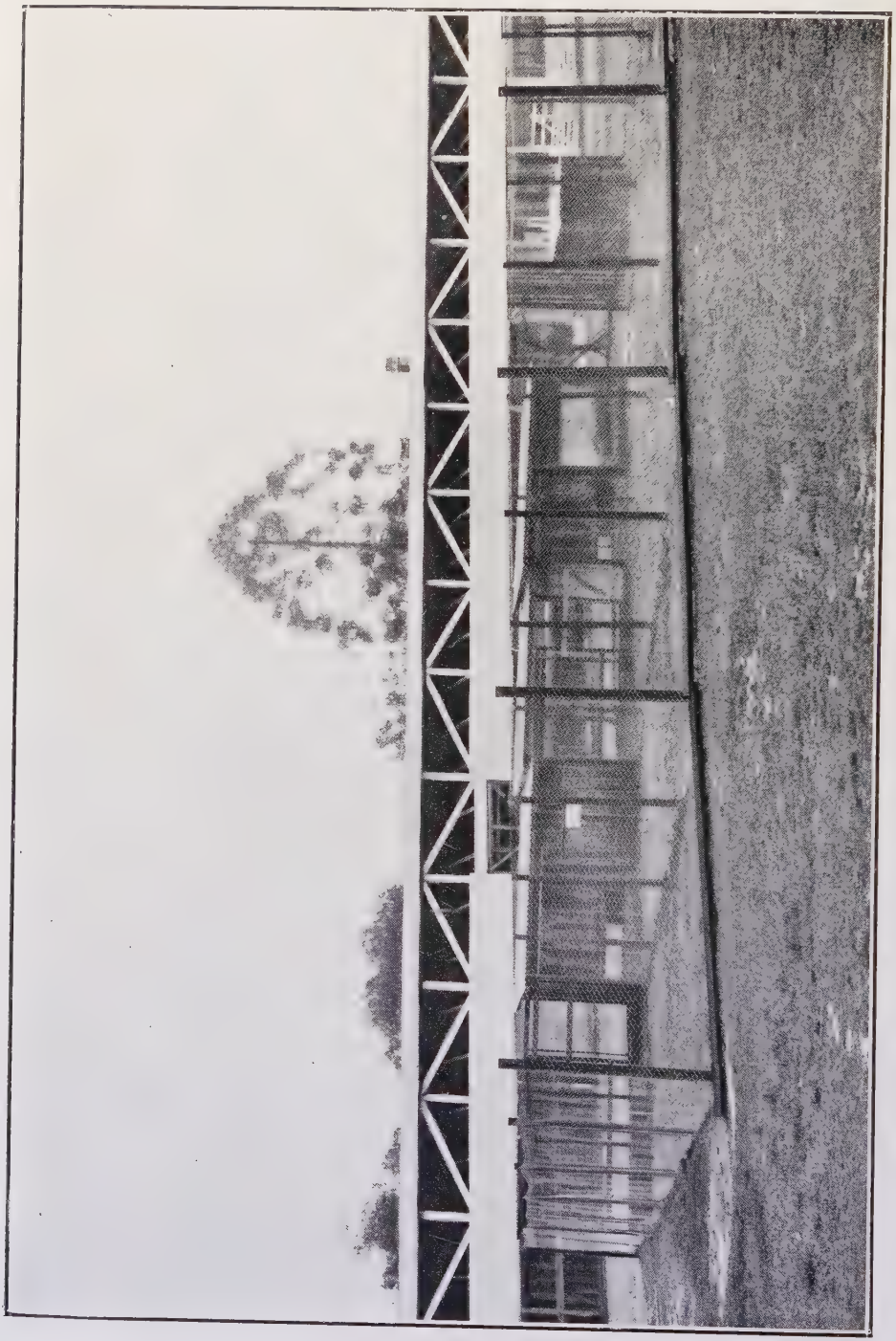


PLATE 24.—GENERAL VIEW OF EXHIBITION POULTRY PENS.

Plate 25.—Back View, showing a Completed House and Framing Walled with Roofing Felt.

blowing at the back of the buildings, the air is given an upward tendency, and as it passes from a comparatively narrow opening into the wider space of the building its rate of motion is slowed off and there is no down draught thrown on to the birds. On the other hand, if the wind comes from the front, it is blocked by the back in the lower part of the house, while the upper air is forced to curl downwards to escape through the vent. This downward curl prevents the lower air from moving upwards and tail-draughting the birds. (*See* Plate.)

One-half of the front is walled up with a 3-feet width of felt, and above this wire netting is used. The ends are closed in a manner similar to the back, except that the first batten is placed up 15 inches and the next 3 feet above this. By this means these end battens can be extended over the back and front battens, and are nailed on to the studs.

Having fixed the back and front walling, 2-inch and 1-inch fillets are nailed on the inside of each corner post to carry the end walling. It will be noted that the ends are not completely filled right up to the roof, nor is such filling necessary, except on the outer ends of the continuous building.

The roof plates are 3-inch by 1½-inch pine, halved into the studs. No rafters are used. If covered with corrugated iron the sheets are nailed directly on to the roof plates. If covered with roofing felt, board across from roof plate to roof plate and then lay the felt longitudinally with an overlap of 2 inches at the joint.

If any other flexible material, such as tarred or oiled hessian, is used for walling, a similar framework should be used, as later the more permanent roofing felt can be easily attached.

Where sawn palings can be secured at a reasonable cost, a good walling can be made of them, and their use will dispense with the 8-inch by 1-inch pine boarding, except at the doorway, the opening in front, and at the nest-box opening. When using the palings, set the first layer with spaces between them of 2 inches or more, depending on the width of the palings. Set the second layer so as to cover the gaps, allowing an inch overlap on each side. (*See* Plate.)

The dropping board is 8 feet by 2 feet, and rests on the lower batten at the back, and is supported at the end wall by a vertical batten (*see* fig. 4), while the outer end rests on an angle bracket, thus leaving the floor quite free for cleaning.

The door is made of T. and G. pine, and opens inwards. The roosts are made of 3-inch by 1-inch hardwood, attached to hardwood blocks at each end. These blocks should be small enough to allow the end of the perch, block and all, to be inserted into a kerosene tin for disinfecting purposes. The roost merely rests on the dropping board; it is not attached.

The nest-box is external, and consists of a long box 14 inches wide at bottom, 14 inches deep at back, and 16 inches deep at front. The ends of 1-inch pine, the top, back, and bottom of ½-inch timber. The ends are cut so as to allow the top to extend inside the building while the bottom rests against the pine boarding. The arrangement for the covering is shown in fig. 6, the hinged part having an

Plate 26.—Back View, showing Completed House and Framing Walled with Sawn Palings.

underlay of 1½ inches, so that, when closed, it forms a waterproof lid. Along the inner edge of the fixed part of the top is a 2-inch by 1-inch fillet which hooks under the pine batten when the nest-box is in position.

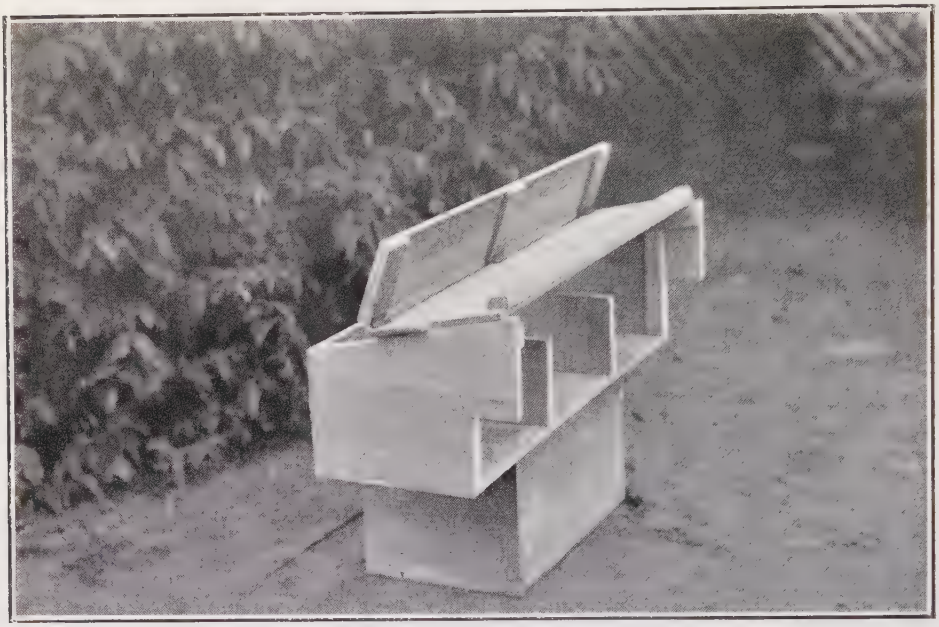


Plate 27.—Detachable External Nest Box.

On the pine boarding, and so as to allow the nest-box to rest on it, there is another 2-inch by 1-inch fillet. To remove the nest-box, lift the outer edge and the box will drop out.

Fences.

For the fencing of the yards, corner posts of 3-inch by 3-inch hardwood are used. For intermediate posts 3-inch by 1-inch hardwood set on edge to the wire are used. They are sunk 18 inches in the ground and have nailed on to the bottom portion a short length of 3-inch by 1-inch hardwood about 2 feet long, so as to make that portion in the ground 3 inches by 2 inches. The posts are set about 12 feet apart. All along the bottom, and half sunk into the ground, is nailed a 3-inch by 1-inch batten. Where joins have to be made, drive in a 3-inch by 1-inch stake to nail on to. Note, there are no struts used for the corner posts, nor any top straining wire. To attach the wire-netting, roll out the length, attach the shorter edge (one edge is always shorter than the other) to the tops of the posts, pulling as tight as you can by hand. Next, starting from the centre post of the fence, stretch the wire down well and nail to the batten at the bottom of the post. Treat each post similarly, working out towards the ends. Next pull the wire down fairly firmly in the centre of each panel, and nail to the bottom batten, then half-way between centre and each post, and again in half intervals. When the bottom is completed nail down each corner post; then, with a

piece of 3-inch by 1-inch catch each successive mesh along the top, and push upwards so as to straighten the top line. If too much strain has been exerted in pulling down on to the batten in the centre of the panels, this may be somewhat difficult. After the above has been completed the wire should lie fairly evenly, but if there are bulges, even big bulges, they can be removed as follows:—Take a piece of hardwood about 6 inches long and 1 inch square. Cut across one end a coarse sawcut about ½-inch deep. Use this as follows:—Slip the sawcut over the double wire between meshes, and then turn smartly. This makes a kink which will take up the slack. Where a bulge occurs, start somewhat above it working vertically down through its centre to some little distance below the bulge. Start with a light twist, increasing as you come into the bulge itself, and get gradually lighter as you finish. If properly carried out, the above gives a well-laid netting fence which, because of even tension, supports itself. There are no struts to assist birds in climbing over, while the absence of a visible top wire prevents a bird from attempting to fly. The yards are shown as 37 feet long, allowing four dividing fences to be cut from a 50-yards roll of wire netting. (*See* Plate.)

Combined Broody and Cockerel Coop.

Plate 28 shows a combined broody and cockerel coop. The uprights are 2 inches by 2 inches, and the general framework consists of 2-inch by 1-inch timber, the sides, back, and roof being made of ½-inch pine. The floor is about 2 feet off the ground, and the coop is 2 feet deep, 2 feet 6 inches high in front, and 4 feet wide. The picture shows the construction of the doors, the lower parts of which are slotted so as to allow of

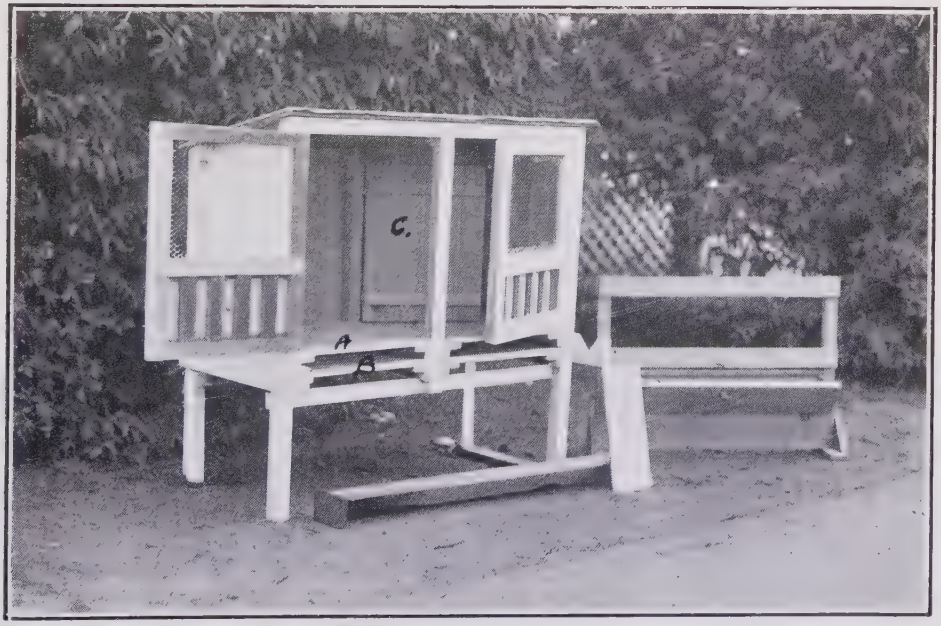


Plate 28.—Combined Broody and Cockerel Coop.

feeding from the trough (shown on the ground), which fits into the V-shaped bearers at the ends. The slotted portion can, however, be closed by means of a board held in position by battens. The floor can be made either slatted or solid by altering the position of the false bottoms A and B which slide into position. A dividing door (C) is shown, which allows a cockerel to be kept in one half with solid floor and door slats covered and a broody hen in the other half, with slatted floor and uncovered slats in the door to enable her to feed from the outside trough. Note, the trough is so placed that it does not interfere with the swing of the doors.

To the right of the broody coop is shown a *swinging wet mash hopper* which could readily be placed in the back wall of a poultry-house. It consists of a V-shaped trough hinged on to the building along its bottom line. The picture shows the trough swung out ready for filling or cleaning as the case may be.

Plate 29 shows a safety hen and chicken coop. It consists of a box 2 feet by 2 feet square, 2 feet high in front, and somewhat less behind. Near the top of both back and front there is an opening covered with wire gauze. The top is loose and is shown leaning against the side. The box is loose on the bottom flooring. The door in front is double, the inner portion is framed round with 2-inch by 1-inch, and covered

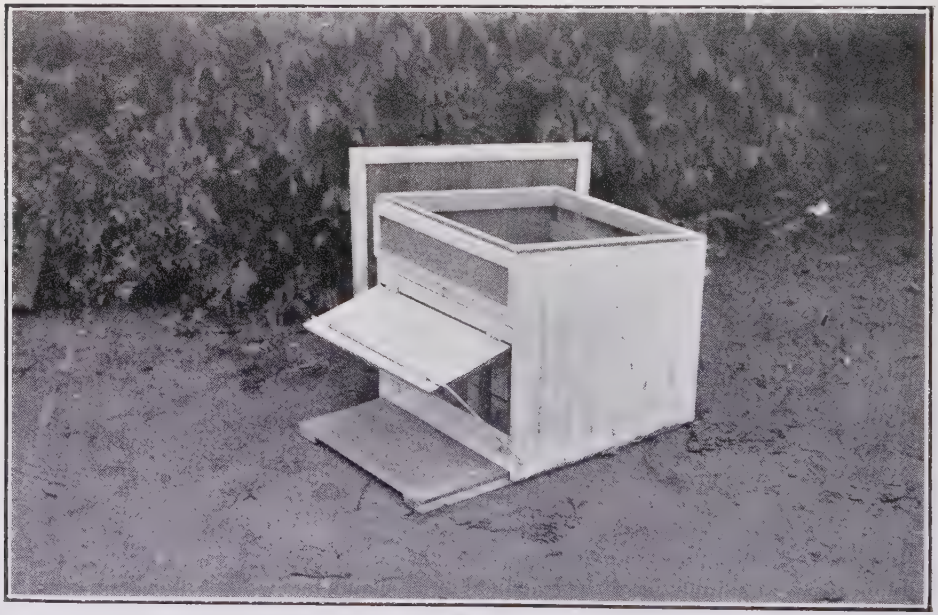


Plate 29.—Safety Hen and Chicken Coop.

with slats, hinged from the bottom and kept in position by a button at the top. The outer portion consists of a board to cover the slats. This is hinged to the upper framing of the inner door. An iron rod, bent as shown in the picture, passes through eyelets on the face of this board

and ends in hooks which fit into eyelets screwed into the side of the box. A second eyelet is shown further back, to hook into when the door is closed.

By this arrangement the hen can be kept in the coop, the chickens running free. The raised door acts as shade for the food. At night all can be closed up, and by lifting the lid and brushing out mosquitoes the coop becomes practically pest proof. As the coop is loose from the bottom, it can be raised slightly and the hen walked along till the floor is uncovered, when it can be readily cleaned, placed on fresh soil, and the coop and hen replaced on it.

Plate 30.—A Simple Heated Brooder.

Plate 30 shows a simple brooder using an ordinary hurricane lantern as a source of heat. It consists of a box 3 feet to 3 feet 6 inches square on the base, 2 feet high in front, and 18 inches high at the back, the whole standing on legs about 6 inches long. In the front there is an opening to lead out into a wire-covered run. The top is hinged on the front. Inside there is a cylinder of wirenetting surrounded by felt sheeting. This is large enough in the circle to hold a hurricane lamp, allowing about 2 inches to spare all round. The cylinder is about 8 inches high. Resting on fillets on the sides is a false top with a hole cut in its centre of somewhat less diameter than the circle of the cylinder described above, but large enough to allow the hurricane lamp to pass through.

This false top should lie about 1 inch above the wire cylinder and below the top of the lamp glass, thus letting the lamp fumes deliver above the boarding. Three-quarter-inch auger holes are bored through the sides and front to carry off the burnt air.

Viticulture.

REPATRIATION AND THE WEST.

By C. A. GATTINO.

In my notes on "Viticulture and Wine Industry after the War," which appeared in the May issue of the "Queensland Agricultural Journal," I stated that, with the protection of the Government, the returned soldiers would find greater attraction and more glorious promise in the future of a vineyard than in anything else.

In the West, especially where immense areas of dry calcareous loam soil are not utilised and are uncultivated, and where the irregular and unreliable rainfall prevents the progress of intense culture of other crops, the grape culture is the most adapted for such districts.

The men who are willing to settle on the land when they return home are generally looking for land in the neighbourhood of the locality in which their relatives and friends reside. Many thousands of our best lads, who have so willingly gone abroad to defend this fair land, belong to these Western districts, and it is only fair that the requirements of those brave returned soldiers should be satisfied by providing the best possible conditions and attractions for adequately settling them upon the nearest land from where they originally came.

I can firmly state that in these Western districts grape culture is the most appropriate, the most advantageous and attractive cultivation for small holdings, and for our returned soldiers; but what should we provide to assure the success and prosperity of such a great agricultural pursuit?

Above all, the help of the Government, by establishing a Western soldiers' group settlement formed for that culture, is essential.

By doing this, the Government would be able to offer returned soldiers the most reliable inducements, with the cheapest and most efficient organisation and instruction.

The settlers also will be benefited, because, having small pieces of suitable land in the same group, they can easily assist each other in ploughing, subsoiling, combating diseases, pruning, harvesting, &c.; they can also join together and build a large cellar in common, form an association, co-operative stores, &c.

The Government, however, will have to assure:—

1. That an expert Government viticulturist will give practical and active assistance so as to make grapegrowing as easy and profitable as possible, and teach them how to make good, natural, hygienic wine.
2. That grafted phylloxera resistant vines be supplied to them at special rates and conditions.

3. That the formation of a co-operative winery (as per my articles which appeared in the September, October, and November, 1916, issues of the "Queensland Agricultural Journal") will be subsidised, or a State winery established.

4. That the wine industry will be protected by adequate laws, facilitating the development of the local production and the consumption of wine.

These few inducements will assure the formation of such soldiers' group settlements, and the vine culture, which is a neglected agricultural pursuit in this State, will flourish and bring new wealth to the country.

As I said before, there is no other culture better suited for closer settlement.

Vine culture gives more freedom than any other in the light work that it involves, and it is unequalled for its constant and remunerative returns in comparison with the small capital that it requires.

Winegrowing employs more labour per acre than any other form of agriculture, and is a primary industry which should be of national importance in a country like this, so eminently suited for the industry.

Besides the labour involved in grapegrowing, other forms of labour and wealth are attached to every consequent branch of the wine industry.

Therefore, the industry is of economic and national importance, and must be well considered by our politicians in the framing of their post-war policies for employing the hundreds of thousands of men who will be returning home without affecting or endangering the labour market of Australia.

The fact, also, that our Australian troops now in Europe are daily enjoying their glass of light wine; recognising it as the most wholesome and purest of all stimulating drinks; observing the sobriety of the countries so eminently wine producers and drinkers; admiring how arid rocks and plains were converted into such beautiful smiling vineyards, with up-to-date cellars and distilleries, through which industry millions of people find peaceful and light work, will necessarily create in those brave soldiers the ambition to follow their mates of the allied countries in their wholesome and sober drinking habits, and induce them to make every effort to bring the viticultural industry of Australia to a prominent rank in similar industries of the world.

Certainly we must not mix up this agricultural pursuit with the liquor question. They are two different things altogether: I contend, rather, that the progress of the viticultural industry would lead to the automatic solution of the liquor problem—"The wine chases out the alcohol," and once the winegrowers become the proprietors of one of

the prominent cultures of the country and be well organised, with power to consolidate their political privileges, they would necessarily force the introduction of adequate laws for controlling and moderating the alcohol traffic.

By encouraging the proper handling and the progress of the wine industry, the consumption of wine must increase, drunkenness caused by alcohol be minimised, and temperance promoted.

The Wine Growers' Association are practically the real temperance societies, the actual temperance party of this country having fanatically jumped into the prohibitionist stage.

Pure light wine I consider the best temperance agent; but as long as the production of wine, for lack of Government encouragement, remains a neglected industry, so long will alcohol continue to be the triumphant beverage. There is no hope of accomplishing a thorough reform, for human nature has proved that it needs a stimulant.

By a practical scheme, which can be easily elaborated on the principles abovementioned, the Government could already make a start by establishing one of these grape group settlements in the Maranoa District, where millions of acres, near railway lines, are well adapted for settlement of that kind.

I conclude with the hope that our brave soldiers, when they return home, will be the triumphant saviours of this rich but throttled agricultural industry, as they were triumphant in the powerfully obstructed landing at Gallipoli.

HINTS TO GRAPEGROWERS.

Location.—The location of a vineyard, the choice of soil and the variety of grapes to be grown on it, have great influence on the productivity of the vines.

The vine grows best on hillsides, or possibly self-draining grounds, in localities sheltered from cold winds, not subject to late frosts or to heavy rainfalls during the gathering of grapes.

Soil.—A dry, calcareous loam soil is the most suitable for vines. Soils without any lime are not adapted to this cultivation unless you fertilise them with agricultural lime. Potash and iron are also very good soil qualities. The soil destined to this culture must not hold the moisture and should be at least 3 feet deep.

Planting.—Having chosen an appropriate location for the vineyard, and the variety of vines to plant, shall we choose cuttings or rooted plants?

Opinions on this subject are varied. There are those who prefer the rooted plants, because they are already provided with roots and are able in the first year to develop quicker and have the advantage of gaining one year's vegetation during the period of the first three years. Others, on the other hand, condemn the rooted plants, saying that being used to a certain soil they will suffer by replanting and bringing them into another soil, and never become strong, healthy plants; the cuttings instead, on the contrary, forming roots in the same soil where they grow, will get used from the beginning to the conditions of the same soil and climate.

For myself, I prefer the rooted plants, provided, however, that you can get them one year old and possibly grown in a similar soil to that of your vineyard. In case you should be compelled to use cuttings, get only strong, sound, and uniform ones; of short jointed wood, with well fed eyes, and with the stem smooth and firm without any spot produced by disease.

The method of planting grapes varies according to the soil, and the distance between the plants also varies according to the cultivation and training methods to follow.

If the vines are trained so as to form the head about a foot above the ground, situated in arid dry soil, and are to be cultivated with the hoe only, you can plant them from 3 to 4 feet apart each way. In training them for high cultivation, the distance between each plant should be greater. There is no plant like the grape which in variety or form of training and cultivation is so dependent upon climate, soil, and location; therefore the width of the rows would vary according to the aforesaid circumstances. The ground will have to be kept free of weeds, and it is left to the grower to do this work in the most economical and appropriate way. If the location of the ground allows of it, and you want to cultivate the vineyard by ploughing between the rows and hoeing around the vines, then the width of the rows should not be less than 7 feet, and in this case, you can plant the vines in the rows less than 3 feet apart. For planting rooted plants, dig holes of about 18 inches in depth, at the bottom of w hich place a very fine mixture of earth and manure. After having shortened the roots and tops of the plant, lay it in the hole above the aforesaid manure mellowed earth, spread out its roots evenly and vertically, then fill in the hole with earth, taking care that the soil immediately above the roots be well pulverised. The upper bud is, of course, left above the ground. In planting cuttings you can practice the same system as for rooted plants, or plant them by making a hole in the cultivated ground with a crowbar, and putting the cutting in, making the earth well adherent to it. If while planting you fear a drought, it is advisable to water the hole and the cutting. It is also a good practice for very compact soils to put sand or sawdust in the holes where you have to plant the cuttings. The rooted plants or the cuttings must not be planted too deep—18 inches is deep enough. In laying the cuttings too deep you would prevent the formation of an ample roots system.

(*To be continued.*)

Botany.

PLANTS POISONOUS TO STOCK.

By C. T. WHITE, Acting Government Botanist.

TAPE VINE (STEPHANIA HERNANDIAEFOLIA, *WALP.*).

The list of plants in Australia reputed poisonous or harmful to stock is a fairly lengthy one. In very few cases, however, have we any definite information about the particular plants (suspected), there being a great lack of knowledge on this most important matter. There are two methods of gaining more accurate information on the subject: the one by the experimental feeding of animals upon the suspected plant and the other by the establishment by chemical analysis of the presence therein of definite poisonous principles.

At various times specimens of the vine *Stephania hernandiæfolia* (Tape Vine) have been sent in for identification as being suspected of causing losses amongst stock.

In December, 1912, Mr. J. L. Bowman, Stock Inspector, Booningba, wrote to the Department "I am forwarding a small parcel of vines gathered on Tallebudgera Creek about the scene of the deaths of cattle which have taken place during November and December for several years past; several local residents believe this vine to be poisonous, and say that cattle eat it freely at times."

In February, 1916, Mr. D. McKenzie, Beechmont, sent specimens with the remark "We had four goats and four young poddies that died apparently from poison; they were feeding in the paddock in which these plants grow."

Poisonous Properties.

Dr. T. L. Bancroft (Proc. Linn. Soc. N.S.W., vol. IV., n.s. p. 1063, 1889) found the roots to contain an exceedingly poisonous alkaloid. Rennie and Turner (Trans. Roy. Soc., Sth. Aus., vol. 17, p. 186, 1893, and Report A.A.A.S., 1895, p. 277) separated and identified *picrotoxin* as one of the constituents of the plant, and stated that there was at least one alkaloid in addition, as reported by Dr. Bancroft. Dr. J. Shirley (Proc. Roy. Soc. Q., vol. XI., p. 88, 1896) records the use of *Stephania hernandiæfolia* as a fish poison among the aborigines of the Nerang and Mudgeraba districts; he states "A well-known waterhole or rockpool, noted as a good haunt for fish, is selected and the bruised stem (cut up into about 2 ft. lengths) is scattered about in the water of the pool, the fish float on the surface of the water and soon find their way into the dilly-bags of the operators." Harris and Smith, in their paper "Fish Poisons of the Queensland Aborigines" (Mem. Queens. Mus., vol. V., p. 8, 1916), working on the whole plant state: "Separation of the alkaloid and of a supposed picrotoxin fraction showed the former to be rather slowly toxic at a concentration of 1:50,000; with the latter no physiological effect was observed. The alkaloid is probably the chief active constituent of the poison."

Plate 31.—Tape Vine (Stephania Hernandiaefolia).

Brief Description.

A climber. Leaves broadly ovate, orbicular or nearly triangular, usually more or less peltate. Flowers in umbels in the axils of the leaves, the common peduncle bearing about five rays, each ray terminated by a head of 8-12 minute flowers. Drupe compressed, orange-red, epicarp succulent, endocarp bony and transversely tuberculate.

Distribution.

Common in the coastal country throughout Queensland; also found in New South Wales and Victoria; it extends beyond Australia, being found in tropical Asia and tropical Africa.

MAPLETON STATE SCHOOL.

By the courtesy of the Under Secretary for Education we have received the following letter addressed to him by Mr. F. E Watt, head teacher of the Mapleton State School, giving an account of an educational visit to the school by the pupils of the Nambour Rural and Yandina Schools on the 10th August last:—

"On Friday, 10th August, a party of eighty pupils from the Nambour Rural School and Yandina School visited this school for the purpose of observing the agricultural work of the school plot, and taking part in the planting of a number of citrus trees in the new portion of the plot.

Mr. T. G. Fisher was in charge, and other teachers present were Messrs. J. Lane, J. T. Wilson, T. E. Martin, and F. M. Barton.

On arrival at Mapleton, about 11.45, the pupils marched to the school. Here I gave them a brief outline of the work to be undertaken, explaining the methods to be adopted and objects aimed at. I showed them scale pests at various stages and drew their attention to several interesting features of the school plot. After lunch the children were divided into groups, which were taken charge of by members of the school committee, Messrs. W. J. Smith, J. R. Morris, and W. Collins, experienced and successful fruitgrowers, who had kindly attended to assist in planting operations. After a demonstration of deep-planting by Mr. Smith, the squads set to work and in a little more than an hour, under the careful supervision of the abovenamed gentlemen, the children had planted a small orchard of twenty-four trees. The majority of them took a keen interest in the work and seemed quite delighted to be allowed to carry out the practical part of the work.

On completion of planting, the pupils marched to the orchard of Mr. W. J. Smith to witness pruning operations on the Maltese system. An expert pruner was at work, and he gave an exhibition of pruning for the benefit of the children. The party left Mapleton at 3.30 and arrived at Nambour about 4.45.

The trees were donated to the school by Messrs. Ferguson and Son, through their agent, Mr. Droney, of Woombye, and appear to be a healthy, vigorous lot. Of the total number, twelve are Washington Navels, on which variety it is proposed to try methods of (1) deep cultivation, (2) cincturing, (3) irrigation, in an attempt to solve the problem of the irregular cropping of this variety.

General Notes.

REGISTRATION BY THE POSTMASTER-GENERAL OF LABORATORIES.

The Department of Agriculture and Stock has received from the Deputy Postmaster-General of the Commonwealth of Australia, notice to the effect that, as it is understood that the Department's Stock Experimental Station at Yeerongpilly may be sending or receiving pathological or bacteriological specimens by post for laboratory diagnosis, a form for completion with the view of the laboratory in question being registered in pursuance of the Postal Regulations has been supplied to the department:—

(2) Regulations 46 and 76.

46 (*a*) Pathological specimens addressed to laboratories registered by the Postmaster-General may be accepted for transmission by registered package post under the following conditions, viz.:—

(*b*) The liquid or substance forwarded for examination must be enclosed in a receptacle hermetically sealed, which receptacle must itself be placed in a strong wooden or metal case in such a way that it cannot shift about, and with a sufficient quantity of some absorbent material (such as sawdust or cotton wool) so packed about the receptacle as absolutely to prevent any possible leakage from the packet in the event of damage to the receptacle.

(*c*) The packet must on no account be dropped into a letter box or be sent by parcel post. Any packet of the kind, whether registered or not, found in the post, not packed as directed, shall be deemed to be posted in contravention of the "Post and Telegraph Act, 1901-1913," and dealt with accordingly.

(3) Any person who sends by post pathological specimens, otherwise than as provided by these Regulations, shall be liable to a penalty not exceeding £50.

(4) A packet containing any pathological specimens shall not be accepted for transmission, or, if found in the post, shall not be delivered unless addressed to a laboratory which has been registered by the Postmaster-General in accordance with these Regulations.

76. Pathological specimens addressed to the General Superintendent, Imperial Cancer Research Fund, London, and sent by registered medical or veterinary practitioners, or by recognised pathological or related scientific laboratories, may, if securely packed in tubes enclosed in wooden cases, be forwarded by sample post.

UTILISING COTTON IN THE HOME.

We have received from Mrs. H. C. P. Crees, of Ayr, two pretty samples of crochet work with Queensland cotton, grown, spun, and worked up as here shown, by Mrs. Crees. The spinning of the cotton does not present any more difficulty than spinning wool, and the resulting yarn can be utilised for many domestic and artistic articles.

TANNING KANGAROO SKINS.

Hair may be removed from skins before tanning by soaking in lime water for several days, or the skins may be folded together, when fresh, and kept warm, so that they will begin to putrefy. Each of these processes will loosen the hair, which may then be scraped off with a knife. All skins may be treated in the same manner. In actual tanning with wattle or other bark, various strengths are used, beginning with a weak solution of the bark and finishing up with a saturated solution, in which chopped bark is often packed between the layers of skins as they are placed in the final pit or tub. Strengths are gauged not by the amount of bark used, as the tanning content varies greatly in different samples of the same variety, but by testing the specific gravity of the solution.

THREE HUNDRED AND SIX CENTURIES LOST BY STRIKES.

In nine months we lost 306 centuries through strikes in one State. So appalling are the figures that one might doubt their accuracy if they came from a source less reliable than the State Industrial Commission of New York. The report gives the details of this enormous waste.

During the period from October 1, 1915, to June 30, 1916, there were 328 strikes reported, involving directly 222,325 persons who lost 8,144,438 days and indirectly 31,629 persons were thrown out of employment for 1,466,725 days, making a total of 9,581,163 days' lost time.

This is a most striking proof that we deserve the title of Industrial Wasters of the World. The responsibility for this loss is not easily placed; a strike too often is the result of a combination of circumstances. But if, when a strike seems imminent, both employer and labourers would consider the total loss to our nation, we might be able to save a few centuries, and thus preserve our most valuable commodity—time.—"American Industries."

[And a still more valuable commodity—the hearths and homes of the strikers' families.—Ed. "Q.A.J."]

SOCIETIES, SHOW DATES, Etc.

Coorparoo.—Coorparoo Progress, Horticultural, and Industrial Association. Show date: 31st August, 1918. W. D. Dell, secretary.

Malanda.—Eacham P.A. and I. Society. The show was postponed from 29th and 30th August to 26th and 27th September.

Innisfail.—Johnstone River Agricultural Society. Show date: 21st and 22nd September. T. Nisbet, secretary.

Woodford.—Woodford District Fruit Growers' Association. H. Cameron Cowie, secretary.

Plate 32.—Crochet Work on the Farm, from Home-grown Cotton.

Answers to Correspondents.

GOPHERS.

"Farmer"—

Gophers are always mentioned in American agricultural journals, as they are very important enemies of agriculture. The ground squirrel usually is called a gopher, although the term should be reserved for an entirely different family of mammals—the pocket gophers. Five species of the ground squirrel are found in the valley of the Mississippi River and its tributaries, and everywhere they are recognised as a pest of agriculture on account of their habit of feeding on pasture grasses and grain, of which latter crops they consume vast quantities. They also do much damage (as do moles in Europe) on account of the large mounds they throw up in digging their burrows. Their flesh, like that of our Australian bandicoot, is tender and of a delicate flavour. They are usually destroyed by the use of carbon bisulphide.

THE QUEENSLAND GIANT RAT.

Mr. A. M. MacDiarmid, Crow's Nest, writes:—"I have just read in the "Queensland Agricultural Journal" your notes on "The Queensland Giant Rat" which Mr. H. A. Longman states is found in North-eastern Australia. I thought that you would be interested to know that a specimen of the same species of rat was found here a few weeks ago. It was found amongst a quantity of firewood that had been cut into blocks and had been stacked up for some months. The men that found it did not know what it was and brought it into town alive. The writer very quickly found it had teeth, as when he was examining it, the rat bit him right through the finger. Needless to say the rat did not stay alive very long. It is the first of the kind ever caught here to the writer's knowledge. Your notes upon the matter have now cleared the mystery up, as no one knew what it was before."

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER, 1917.

Article.		SEPTEMBER. Prices.
Bacon	lb.	9½d. to 10d.
Barley	bush.	2s. to 5s. 6d.
Barley (Local)	„	1s. 6d. to 2s. 2d.
Bran	ton	£5 15s.
Broom Millet	„	£18 to £25
Butter (1st Grade)	cwt.	158s. 8d.
Chaff, Mixed	ton	£5 12s.
Chaff, Oaten	„	£5 10s. to £5 15s.
Chaff, Lucerne	„	£3 10s. to £7 10s.
Chaff, Wheaten	„	£1 10s. to £3 15s.
Cheese	lb.	9½d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	£6 15s. to £7 15s.
Hay, Lucerne	„	£4 15s. to £5
Honey	lb.	3½d. to 4d.
Maize	bush.	2s. 6½d. to 2s. 9½d.
Oats	„	1s. 6d. to 2s. 6d.
Onions	ton	£12 to £14
Peanuts	lb.	3½d. to 4d.
Pollard	ton	£5 5s.
Potatoes	„	£6 15s. to £8
Potatoes (Sweet)	sug. bag	1s. 6d. to 2s.
Pumpkins (Cattle)	ton	£2 10s. to £2 12s.
Eggs	doz.	9½d. to 10½d.
Fowls	per pair	4s. to 6s. 6d.
Ducks, English	„	3s. 6d. to 4s.
Ducks, Muscovy	„	4s. to 6s. 9d.
Ducks, Wild	„	3s. 6d.
Geese	„	7s. to 8s.
Turkeys (Hens)	„	9s. 9d. to 13s. 4d.
Turkeys (Gobblers)	„	14s. to 18s. 6d.
Wheat (Milling)	bush.	2s. 6d. to 3s.
Hares (Alive)	pair	15s.
Hares (Dead)	„	5s.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	4s. to 7s.
Cauliflowers, per dozen	7s. to 10s.
Celery, per bundle	...
Beans, per sugar bag	8s. to 12s.
Peas, per sugar bag	9s. to 12s.
Carrots, per dozen bunches	1s. 3d. to 1s. 9d.
Chocos, per quarter-case	...
Beetroot, per dozen bunches	1s. to 1s. 3d.
Lettuce, per dozen	1s. to 2s.
Marrows, per sack	3s. to 4s.
Parsnips, per bundle	7d. to 10d.
Sweet Potatoes, per sugar bag	1s. 6d. to 2s.
Table Pumpkins, per dozen	4s. to 5s.
Tomatoes, per quarter-case	4s. to 7s.
Rhubarb, per dozen bundles	...

SOUTHERN FRUIT MARKETS.

Article.	SEPTEMBER. Prices.
Bananas (Queensland), per case	8s. to 11s.
Bananas (Tweed River), per case	...
Bananas (Fiji), per case	18s. to 20s.
Bananas (G.M.), per bunch	...
Bananas (G.M.), per case	...
Guavas, per case	...
Lemons (Local), per bushel-case	2s. to 4s. 6d.
Mandarins, per case	2s. to 6s.
Oranges (Navel), per case	8s. to 12s.
Oranges (Queensland), per case	6s. to 10s.
Papaw Apples, per half-bushel-case	7s. to 10s.
Passion Fruit, per half-case	1s. 6d. to 6s.
Pineapples (Queens), per double-case	4s. 6d. to 7s.
Pineapples (Common), per double-case	4s. 6d. to 6s.
Tomatoes, half-bushel-case	3s. to 5s.
Strawberries (Queensland), per tray	4s. to 6s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	SEPTEMBER. Prices.
Apples, Eating, per case	12s.to 14s.
Apples, Cooking, per case	13s.
Bananas (Cavendish), per dozen	3d. to 4d.
Bananas (Sugar), per dozen	2d. to 3d.
Cape Gooseberries, per quarter-case	7s. to 10s.
Citrons, per hundredweight	10s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	3s. to 3s. 6d.
Custard Apples, per tray	4s. to 6s.
Lemons (Lisbon), per tray	6s. to 7s.
Limes, per tray	...
Mandarins, large, per tray	7s. to 9s.
Oranges (Navel), per case	9s. to 10s.
Oranges (Seville), per hundredweight	11s.
Oranges (other), per case	3s. 6d. to 4s.
Papaw Apples, per quarter-case	2s. to 5s.
Passion Fruit, per half-case	4s. to 6s.
Pears, per half-case	...
Peanuts, per lb.	3½d. to 4d.
Persimmons, per quarter-case	...
Pineapples (Ripleys), per dozen	6d. to 1s. 9d.
Pineapples (Rough), per dozen	6d. to 1s. 6d.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 6d.
Strawberries, per dozen boxes	6s. to 22s.
Tomatoes, per quarter-case	5s. to 8s.

TOP PRICES, ENOGGERA YARDS, AUGUST, 1917.

Animal.	AUGUST. Prices.
Bullocks	£25 15s. to £26 10s.
Bullocks (Single)	£29 5s.
Cows	£15 15s. to £18 5s.
Merino Wethers	46s. 9d.
Crossbred Wethers	48s. 9d.
Merino Ewes	34s. 6d.
Crossbred Ewes	40s. 9d.
Lambs	38s. 9d.
Pigs (Porkers)	63s.

EXHIBITION FAT STOCK SALES.

Animal.	AUGUST. Prices.
Bullocks	£23 to £29 15s.
Bullocks (Guessing)	£28
Bullocks (Champion)	£34 15s.
Bullocks (Heaviest Live Weight)	£35
Cows	£18 5s. to £22 10s.
Cows (Champion)	£25 10s.
Merino Wethers	51s.
Crossbred Wethers	61s.
Crossbred Ewes	60s.
Lambs	43s.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST, 1917, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1917 AND 1916, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of Years' Records.	Aug., 1917.	Aug., 1916.		Aug.	No. of Years' Records.	Aug., 1917.	Aug., 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·87	15	1·70	0·66					
Cairns	1·85	34	2·78	1·64	Nambour	1·89	20	2·28	4·54
Cardwell	1·26	44	1·28	2·79	Nanango	1·51	34	0·79	1·25
Cooktown	1·46	40	0·79	0·93	Rockhampton ...	0·92	29	3·41	2·03
Herberton	0·64	29	1·44	0·79	Woodford	1·98	29	1·34	2·97
Ingham	1·34	24	1·73	2·36					
Innisfail	5·27	35	16·82	3·08					
Mossman	1·80	5	1·26	1·82	*Darling Downs.*				
Townsville	0·41	45	2·07	0·63					
					Dalby	1·26	46	1·05	2·01
					Emu Vale	1·25	20	0·68	1·96
Central Coast.					Jimbour	1·36	28	0·71	1·12
					Miles	1·30	31	0·78	1·33
Ayr	0·38	29	3·05	0·63	Stanthorpe ...	1·95	43	0·83	2·26
Bowen	0·63	45	3·05	0·92	Toowoomba ...	1·83	44	1·89	2·22
Charters Towers ...	0·37	34	2·03	1·91	Warwick	1·55	29	0·99	1·92
Mackay	0·98	45	4·58	0·85					
Proserpine	0·89	13	4·18	0·72					
St. Lawrence ...	0·89	45	1·78	1·17	*Maranoa.*				
					Roma	0·97	42	0·89	1·56
South Coast.									
					State Farms, &c.				
Biggenden	1·18	17	1·63	2·42					
Bundaberg	1·43	33	1·14	2·36					
Brisbane	2·25	66	1·03	1·73	Bungeworgorai ...	0·75	5	1·02	1·51
Childers	1·26	21	1·28	2·00	Gatton College ...	1·33	17	0·82	1·79
Crohamhurst ...	2·43	25	3·61	5·19	Gindie	0·66	17	3·27	1·06
Esk	1·70	29	0·78	1·53	Hermitage ...	1·53	10	0·82	2·13
Gayndah	1·26	45	0·85	2·04	Kairi	0·87	5	1·67	0·55
Gympie	1·89	46	1·75	3·88	Kamerunga ...	1·51	26	2·51	2·08
Glasshouse M'tains	1·62	8	2·04	3·14	Sugar Experiment Station, Mackay	0·77	19	3·96	1·30
Kilkivan	1·62	37	0·65	2·41					
Maryborough ...	1·79	45	2·35	2·66	Warren	1·13	5	3·06	2·40

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON.

1917.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·2	5·34	5·29	5·47	4·59	6·5	4·46	6·28
2	6·1	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·0	5·35	5·27	5·48	4·58	6·7	4·46	6·29
4	5·59	5·35	5·26	5·49	4·57	6·7	4·46	6·30
5	5·58	5·36	5·25	5·49	4·57	6·8	4·46	6·31
6	5·57	5·36	5·24	5·50	4·56	6·9	4·46	6·32
7	5·55	5·36	5·23	5·50	4·55	6·9	4·46	6·32
8	5·54	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·53	5·37	5·20	5·51	4·54	6·11	4·47	6 33
10	5·52	5·38	5·19	5·52	4·53	6·11	4·47	6·34
11	5·51	5·38	5·18	5·52	4·52	6·12	4·47	6·34
12	5·50	5·39	5·17	5·53	4·52	6·13	4·47	6·35
13	5·49	5·39	5·16	5·53	4·51	6·14	4·47	6·35
14	5·48	5·40	5·15	5·54	4·51	6·15	4·48	6·36
15	5·47	5·40	5.14	5·54	4·50	6·16	4·48	6·36
16	5·45	5·41	5·13	5·55	4·50	6·17	4·48	6·37
17	5·44	5·41	5·12	5·55	4·49	6·18	4·48	6·38
18	5·43	5·42	5·11	5·56	4·49	6·19	4·49	6·39
19	5·42	5·42	5·10	5·56	4·48	6·19	4·49	6·40
20	5·41	5·42	5.9	5·57	4·48	6·20	4·50	6·40
21	5·40	5·43	5·8	5·57	4·47	6·21	4·50	6·41
22	5·39	5·43	5·7	5·58	4·47	6·22	4·51	6·42
23	5·37	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·36	5·44	5·5	5·59	4·47	6·23	4·52	6·43
25	5·35	5·45	5·4	6·0	4·47	6·24	4·52	6·43
26	5·34	5·45	5·3	6·0	4·46	6·24	4·53	6·43
27	5·33	5·45	5·3	6·1	4·46	6·25	4·53	6·44
28	5·32	5·46	5·2	6·1	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·2	4·46	6·26	4·55	6·44
30	5·30	5·47	5·0	6·3	4·46	6·27	4·56	6·45
31	...	...	5·0	6·4	4·46	...	4·57	6·45

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

			H.	M.	
1 Sept.	○	Full Moon	10	28	p.m.
8 „	☽	Last Quarter	5	5	„
16 „	●	New Moon	8	28	„
24 „	☾	First Quarter	3	41	„

The Moon will be at its greatest distance from the earth at midnight on the 14th, and at its least distance on the night of the 30th.

1 Oct.	○	Full Moon	6	31	a.m.
8 „	☽	Last Quarter	6	14	p.m.
16 „	●	New Moon	12	41	„
24 „	☾	First Quarter	12	38	a.m.
30 „	○	Full Moon	4	19	p.m.

The moon will be furthest from the earth on the 12th, and nearest to it on the 28th.

7 Nov.	☽	Last Quarter	3	4	a.m.
15 „	●	New Moon	4	28	„
22 „	☾	First Quarter	8	29	„
29 „	○	Full Moon	4	41	„

The Moon will be furthest from the earth on the 9th, and nearest to it on the 24th.

7 Dec.	☽	Last Quarter	12	14	a.m.
14 „	●	New Moon	7	17	p.m.
21 „	☾	First Quarter	4	7	„
28 „	○	Full Moon	7	52	„

The Moon will cause an *Annular Eclipse* of the *Sun* on December 14th, but it will not be visible in Queensland. On the 28th there will be a *Total Eclipse* of the *Moon* between 7.38 and 7.55 p.m. It will be partly eclipsed for an hour and a-half before and after totality.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November, may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Farm and Garden Notes for November.

FIELD.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, cotton, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

KITCHEN GARDEN.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c., and transplant for succession in calm, cloudy weather.

FLOWER GARDEN.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Orchard Notes for November.

THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where the land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple, Mussel, Circular Black, and Glover Scales. Fruit fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-custers should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oïdium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

THE TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am

certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of the year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; for too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

THE SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit fly makes it appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oïdium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oïdium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit fly in the early ripening fruits, and gather and destroy all that may be so affected.